



*Owned by the Citizens of Jonesboro*

September 14, 2012

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

RETURN RECEIPT/CERTIFIED MAIL

Re: NPDES Permit Number AR0043401 AFIN 16-00936

Dear Administrator,

Enclosed are the following documents for the Eastside Wastewater Treatment Facility, NPDES Discharge Permit AR0043401:

- August 2012 Discharge Monitoring Report (DMR)
- August Sanitary Sewer Overflow (SSO) Monthly Report
- 3<sup>rd</sup> Quarter 2012 WET Discharge Monitoring Report

The monthly samples were collected from the Eastside Wastewater Treatment Facility during August 2012.

These results should satisfy the requirements stated in our NPDES Permit. If more information is required, please contact my office at 870.935.5581.

Sincerely,

A handwritten signature in black ink, appearing to read "Jake Rice, III", is written over a horizontal line.

Jake Rice, III, P. E.  
General Operations Director

/: Enclosures





August 6, 2012

Test Results of  
Third Quarter  
Chronic 7-Day Renewal  
Biomonitoring Testing  
for  
• East Effluent  
Jonesboro, AR

Control No. 159597-1

Prepared for:

Ms. Myra Taylor  
City Water & Light of Jonesboro  
Post Office Box 1289  
Jonesboro, AR 72403-1289

Prepared by:

AMERICAN INTERPLEX CORPORATION  
8600 Kanis Road  
Little Rock, AR 72204-2322



August 6, 2012  
Control No. 159597-1  
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City Water & Light of Jonesboro  
ATTN: Ms. Myra Taylor  
Post Office Box 1289  
Jonesboro, AR 72403-1289

Re: Chronic 7-Day Renewal utilizing *Pimephales promelas* (Fathead minnow) and *Ceriodaphnia dubia*  
East Effluent - Jonesboro, AR  
NPDES Permit No. AR0043401 AFIN16-00936

Dear Ms. Myra Taylor:

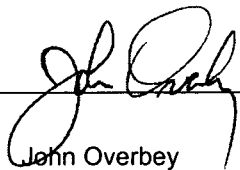
This report is the analytical results and supporting information for the samples submitted to American Interplex Corporation (AIC). The following results are applicable only to the sample identified by the control number referenced above. Accurate assessment of the data requires access to the entire document. Each section of the report has been reviewed and approved by the laboratory director or qualified designee.

Testing procedures and Quality Assurance were in accordance with "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" EPA-821-R-02-013, Fourth Edition, October 2002. Test results are summarized below:

Method 1000.0 Chronic *Pimephales promelas* (Fathead minnow) Survival and Growth Test: The No Observable Effects Concentration (NOEC) for survival occurred at 100 % effluent, which is equal to the critical dilution of 100 %. The NOEC for growth occurred at 100 % effluent, which is equal to the critical dilution of 100 %. **The sample, therefore, PASSED both lethal and sub-lethal effects for the Fathead minnow test.**

Method 1002.0 Chronic *Ceriodaphnia dubia* Survival and Reproduction Test: The No Observable Effects Concentration (NOEC) for survival occurred at 100 % effluent, which is equal to the critical dilution of 100 %. The NOEC for reproduction occurred at 100 % effluent, which is equal to the critical dilution of 100 %. **The sample, therefore, PASSED both lethal and sub-lethal effects for the *Ceriodaphnia dubia* test.**

AMERICAN INTERPLEX CORPORATION

  
\_\_\_\_\_  
John Overbey  
Laboratory Director

PDF cc: City Water & Light of Jonesboro  
ATTN: Ms. Myra Taylor  
mtaylor@jonesborocwl.org

City Water & Light of Jonesboro  
ATTN: Mr. Adam Saulsbury  
asaulsbury@jonesborocwl.org

FTN Associates, Ltd.  
ATTN: Mr. Pat Downey  
pjd@ftn-assoc.com

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I. Control Acceptance Criteria

*Pimephales promelas* (Fathead minnow) Method 1000.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	100	PASS
Control Growth > or = 0.25 mg per Surviving minnow	0.471	PASS
Control Growth CV < or = 40%	8.66	PASS
Growth Minimum Significant Difference 12 to 30%	13.8	PASS
Critical Dilution CV < or = 40%	8.77	PASS

*Ceriodaphnia dubia* Method 1002.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	90.0	PASS
Control Reproduction > or = 15 per Surviving Female	17.7	PASS
Control CV < or = 40% per Surviving Female	30.6	PASS
Reproduction Minimum Significant Difference 13 to 47%	33.3	PASS
Critical Dilution CV < or = 40%	33.2	PASS

II. Outlined Report

A. Introduction

1. Permit Number: AR0043401 AFIN16-00936
2. Test Requirements: Test Methods 1000.0 and 1002.0
3. Receiving Stream:

B. Source of Effluent/Dilution Water

1. Effluent Samples:
  - a. Sampling Point: East Effluent
  - b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	8.2	7.7	7.8
pH (standard units)	8.1	8.6	8.1
Alkalinity (mg/l as CaCO <sub>3</sub> )	180	160	170
Hardness (mg/l as CaCO <sub>3</sub> )	150	150	150
Conductivity (umhos/cm)	420	420	570
Residual Chlorine (mg/l)	<0.05	<0.05	<0.05
Ammonia as N (mg/l)	0.16	<0.1	<0.1

2. Dilution Water Samples: Synthetic Moderately Hard Water #3891

- a. Dates Prepared: July 11 through July 25, 2012
- b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	7.9	7.7	8.1
pH (standard units)	8.1	8.3	8.1
Alkalinity (mg/l as CaCO <sub>3</sub> )	57	57	57
Hardness (mg/l as CaCO <sub>3</sub> )	85	83	82
Conductivity (umhos/cm)	150	150	NA
Residual Chlorine (mg/l)	<0.05	<0.05	<0.05

C. Test Methods

1. Test methods used:

Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, EPA-821-R-02-013; test Methods 1000.0 and 1002.0, Fathead Minnow Survival and Growth and *Ceriodaphnia dubia* Survival and Reproduction.

2. Endpoint: No Observable Effects Concentration (NOEC)

3. Test Conditions:

*Pimephales promelas* (Fathead minnow) Survival and Growth Method 1000.0

Date & Time Test Initiated: July 24, 2012 at 1010  
Date & Time Test Terminated: July 31, 2012 at 1000  
Type & Volume of Test Chamber: 500 ml disposable beaker  
Volume of Sample: 250 ml  
Number of Organisms per replicate: 8  
Number of Replicates per dilution: 5

*Ceriodaphnia dubia* Survival and Growth Method 1002.0

Date & Time Test Initiated: July 24, 2012 at 1345  
Date & Time Test Terminated: July 30, 2012 at 1305  
Type & Volume of Test Chamber: 30 ml disposable beaker  
Volume of Sample: 15 ml  
Number of Organisms per replicate: 1  
Number of Replicates per dilution: 10

4. Acclimation of test organisms: Obtained from in-house cultures

5. Test Temperature: 25 +/- 1 degree Celsius

D. Test Organisms

1. Scientific Name

- a. Test 1000.0 *Pimephales promelas*
- b. Test 1002.0 *Ceriodaphnia dubia*

III. Data Analysis

The data was analyzed using American Interplex Corporation's Laboratory Information Management Software based on Toxstat.

*Pimephales promelas* (Fathead minnow) survival data was transformed using the Arc Sine transformation. Normality and homogeneity of variance were checked using Shapiro-Wilk's. The survival data was then analyzed using Steel's Many-One Rank Test to determine the No Observable Effects Concentration (NOEC).

Fathead minnow growth data was analyzed for normality and homogeneity of variance using Shapiro-Wilk's and Bartlett's test. Dunnett's Test was used to determine the No Observable Effects Concentration (NOEC) for growth.

*Ceriodaphnia dubia* survival data was analyzed with Fisher's Exact Test. Reproduction data was analyzed using Kolmogorov's Test for Normality and analyzed with Steel's Many-One Rank Test to determine the No Observable Effects Concentration (NOEC) for Reproduction. Dunnett's Test was used to calculate the PMSD.



IV. Standard Reference Toxicants

American Interplex Corporation has an ongoing test organism culturing program. The sensitivity of the offspring is determined by performing a standard reference toxicant test with each effluent test. Sodium chloride in synthetic moderately hard water is used as prescribed in EPA-821-R-02-013.

*Pimephales promelas* (Fathead minnow)

Chronic reference tests are performed monthly.

A chronic reference test was performed on July 10, 2012 at 1515 to July 17, 2012 at 1320

The results were as follows: (Control No. 159240-2.)

Survival LC-50: 5830 mg/l

Growth IC-25: 4405 mg/l

Growth PMSD: 24

*Ceriodaphnia dubia*

Chronic reference tests are performed monthly.

A chronic reference test was performed on July 10, 2012 at 1350 to July 16, 2012 at 1335

The results were as follows: (Control No. 159240-1.)

Survival LC-50: 2125 mg/l

Growth IC-25: 1433 mg/l

Growth PMSD: 21.8

V. Chemical Analysis/Quality Control

Parameter	Method	% Recovery	Relative % Difference
Alkalinity	SM 2320 B	NA	0.00
Hardness	EPA 200.7	102	0.450
pH	SM 4500-H+ B	101	0.134
Conductivity	EPA 120.1	104	3.65

VI. Organism History

*Pimephales promelas* (Fathead minnow)

Date: July 24, 2012

Age: <24 hours

Source: In-house culture

Water Chemistry Record:

Alkalinity: 57-64 mg/l

Hardness: 80-100 mg/l

Temperature: 25 deg.C

*Ceriodaphnia dubia*

Date: July 24, 2012

Age: <24 hours

Source: In-house culture

Water Chemistry Record:

Alkalinity: 57-64 mg/l

Hardness: 80-100 mg/l

Temperature: 25 deg.C

VII. Results Summary *Pimephales promelas*, Fathead minnow Larval Survival and Growth Test -- Method 1000.0

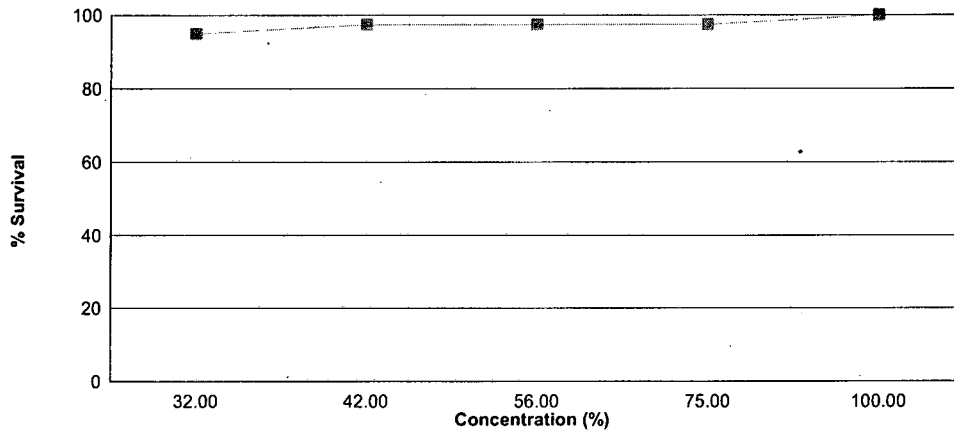
Larvae are exposed in a static renewal system for seven days to different concentrations of effluent with dilution water. Test results are based on the survival and growth (increase in weight) of the larvae.

Effluent dilutions for this test were 32 %, 42 %, 56 %, 75 %, 100 % in accordance with the NPDES permit.

The low flow or 'critical' dilution is specified in the NPDES permit as 100 % effluent.

The test was initiated on July 24, 2012 at 1010 and continued through July 31, 2012 at 1000. Statistical analyses were performed on the observed data and the no observable effects concentrations (NOECs) were as follows:

- a.) NOEC survival = 100 % effluent
- b.) NOEC growth = 100 % effluent



Summary of the 7-day Fathead Minnow Survival and Growth		
Concentration	Percent Survival	Mean Growth (mg)
Control	100	0.471
32 %	95.0	0.431
42 %	97.5	0.444
56 %	97.5	0.466
75 %	97.5	0.510
100 %	100	0.507

VII. Results Summary *Ceriodaphnia dubia*, Cladoceran Survival and Reproduction Test -- Method 1002.0

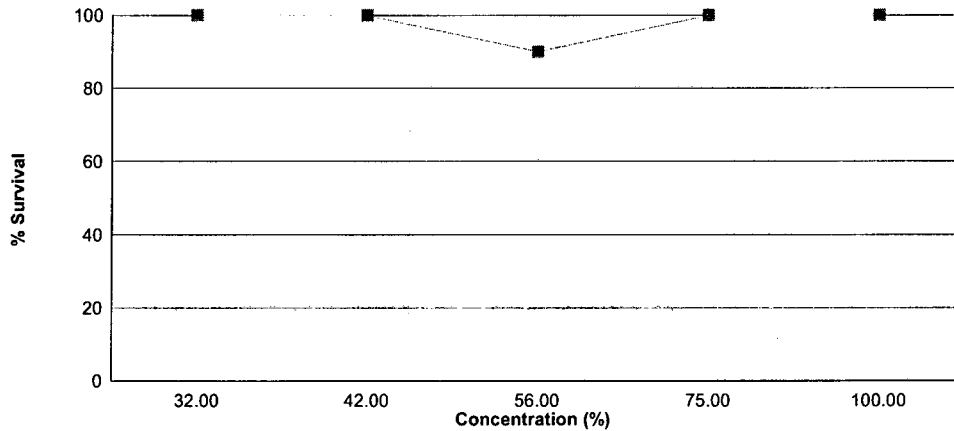
Neonates are exposed in a static renewal system to different concentrations of effluent with dilution water until 60% of surviving control organisms have three broods of offspring with an average of at least 15 young per female.

Effluent dilutions for this test were 32 %, 42 %, 56 %, 75 %, 100 % in accordance with the NPDES permit.

The low flow or 'critical' dilution is specified in the NPDES permit as 100 % effluent.

The test was initiated on July 24, 2012 at 1345 and continued through July 30, 2012 at 1305. Statistical analyses were performed on the observed data and the no observable effects concentrations (NOECs) were as follows:

- a.) NOEC survival = 100 % effluent
- b.) NOEC reproduction = 100 % effluent



Concentration	Percent Survival	Mean Reproduction
Control	90.0	15.9
32 %	100	17.3
42 %	100	16.4
56 %	90.0	13.8
75 %	100	16.4
100 %	100	14.9

Appendix A1: Test 1000.0

*Pimephales promelas* (Fathead Minnow) 7-Day Survival

Date and Time Test Initiated: July 24, 2012 at 1010  
Date and Time Test Terminated: July 31, 2012 at 1000

Concentration	Replicate	Number of Survivors						
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Control	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
32 %	A	8	8	8	7	7	7	7
	B	8	8	8	8	8	8	8
	C	7	7	7	7	7	7	7
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
42 %	A	8	8	7	7	7	7	7
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
56 %	A	8	8	8	8	7	7	7
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
75 %	A	8	7	7	7	7	7	7
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
100 %	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8

Appendix A1: Test 1000.0

*Pimephales promelas* (Fathead Minnow) 7-Day Growth

Test Initiated: July 24, 2012 at 1010  
Test Terminated: July 31, 2012 at 1000

Drying Started: July 26, 2012 at 1318  
Drying Ended: August 1, 2012 at 1300

Concentration	Replicate	Weight of pan	Weight of pan + fish	Total weight of fish (g)	Original # of fish	Mean dry weight (mg)
Control	A	.93951	.94289	0.00338	8	0.422
	B	.94036	.94404	0.00368	8	0.460
	C	.93971	.94375	0.00404	8	0.505
	D	.94519	.94936	0.00417	8	0.521
	E	.94430	.94789	0.00359	8	0.449
32 %	A	.94589	.94933	0.00344	8	0.430
	B	.94359	.94738	0.00379	8	0.474
	C	.94235	.94508	0.00273	8	0.341
	D	.94430	.94809	0.00379	8	0.474
	E	.94698	.95046	0.00348	8	0.435
42 %	A	.94771	.95077	0.00306	8	0.382
	B	.94679	.95051	0.00372	8	0.465
	C	.95120	.95466	0.00346	8	0.432
	D	.95113	.95464	0.00351	8	0.439
	E	.94471	.94871	0.00400	8	0.500
56 %	A	.94302	.94643	0.00341	8	0.426
	B	.94322	.94670	0.00348	8	0.435
	C	.94535	.94878	0.00343	8	0.429
	D	.94488	.94912	0.00424	8	0.530
	E	.94441	.94851	0.00410	8	0.512
75 %	A	.93855	.94248	0.00393	8	0.491
	B	.93798	.94218	0.00420	8	0.525
	C	.94312	.94718	0.00406	8	0.508
	D	.94424	.94814	0.00390	8	0.488
	E	.93945	.94374	0.00429	8	0.536
100 %	A	.94578	.94978	0.00400	8	0.500
	B	.94113	.94498	0.00385	8	0.481
	C	.94280	.94748	0.00468	8	0.585
	D	.94231	.94613	0.00382	8	0.478
	E	.93926	.94319	0.00393	8	0.491

Appendix A1: Test 1002.0

*Ceriodaphnia dubia* Survival and Reproduction

Date and Time Test Initiated: July 24, 2012 at 1345

Date and Time Test Terminated: July 30, 2012 at 1305

Concentration: Control													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	2	0	2	X	3	0	0	0	7	9	0.778
4	2	2	0	4	0	X	0	3	2	3	16	9	1.78
5	8	7	9	8	6	X	9	7	9	8	71	9	7.89
6	0	10	9	0	10	X	12	11	0	13	65	9	7.22
7													
8													
TOTAL	10	19	20	12	18	0	24	21	11	24	159	10	15.9

Concentration: 32 %													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	2	2	10	0.200
4	4	3	4	2	2	4	3	3	4	0	29	10	2.90
5	8	9	9	9	8	9	9	7	9	6	83	10	8.30
6	0	0	9	10	0	2	10	10	9	9	59	10	5.90
7													
8													
TOTAL	12	12	22	21	10	15	22	20	22	17	173	10	17.3

Concentration: 42 %													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	2	2	0	0	4	0	0	2	10	10	1.00
4	2	3	0	2	2	4	0	3	2	0	18	10	1.80
5	6	9	8	8	7	8	10	7	9	8	80	10	8.00
6	0	0	10	7	10	12	9	0	0	8	56	10	5.60
7													
8													
TOTAL	8	12	20	19	19	24	23	10	11	18	164	10	16.4

Appendix A1: Test 1002.0

*Ceriodaphnia dubia* Survival and Reproduction

Date and Time Test Initiated: July 24, 2012 at 1345  
Date and Time Test Terminated: July 30, 2012 at 1305

Concentration: 56 %														
Day	Replicate										No. of Young	No. of Adults	Young per Adult	
	1	2	3	4	5	6	7	8	9	10				
1	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	X	2	3	0	0	0	5	9	0.556	
4	4	2	4	3	X	0	0	2	4	4	23	9	2.56	
5	8	6	8	9	X	8	8	4	9	6	66	9	7.33	
6	0	0	10	0	X	10	11	2	11	0	44	9	4.89	
7														
8														
TOTAL	12	8	22	12	0	20	22	8	24	10	138	10	13.8	

Concentration: 75 %													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	2	0	3	0	4	0	0	0	9	10	0.900
4	2	2	0	3	0	4	0	2	3	2	18	10	1.80
5	8	8	8	9	6	8	8	8	8	8	79	10	7.90
6	0	0	9	0	9	11	9	10	0	10	58	10	5.80
7													
8													
TOTAL	10	10	19	12	18	23	21	20	11	20	164	10	16.4

Concentration: 100 %													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	2	0	2	2	0	0	6	10	0.600
4	2	2	3	3	0	5	6	0	3	4	28	10	2.80
5	8	7	8	8	6	6	9	9	7	9	77	10	7.70
6	0	0	10	0	8	11	10E	9	0	0	38	10	3.80
7													
8													
TOTAL	10	9	21	11	16	22	17	20	10	13	149	10	14.9

E = Excluded fourth brood neonates

Appendix A2: Statistics

*Pimephales promelas* (Fathead minnow) Survival

Transformation of Data			Transform: Arc Sin(Square Root(Y))	
Group	Identification	Rep	Value	Transformed
1	Control	1	1.00000	1.39310
1	Control	2	1.00000	1.39310
1	Control	3	1.00000	1.39310
1	Control	4	1.00000	1.39310
1	Control	5	1.00000	1.39310
2	32 %	1	0.87500	1.20940
2	32 %	2	1.00000	1.39310
2	32 %	3	0.87500	1.20940
2	32 %	4	1.00000	1.39310
2	32 %	5	1.00000	1.39310
3	42 %	1	0.87500	1.20940
3	42 %	2	1.00000	1.39310
3	42 %	3	1.00000	1.39310
3	42 %	4	1.00000	1.39310
3	42 %	5	1.00000	1.39310
4	56 %	1	0.87500	1.20940
4	56 %	2	1.00000	1.39310
4	56 %	3	1.00000	1.39310
4	56 %	4	1.00000	1.39310
4	56 %	5	1.00000	1.39310
5	75 %	1	0.87500	1.20940
5	75 %	2	1.00000	1.39310
5	75 %	3	1.00000	1.39310
5	75 %	4	1.00000	1.39310
5	75 %	5	1.00000	1.39310
6	100 %	1	1.00000	1.39310
6	100 %	2	1.00000	1.39310
6	100 %	3	1.00000	1.39310
6	100 %	4	1.00000	1.39310
6	100 %	5	1.00000	1.39310



Appendix A2: Statistics

*Pimephales promelas* (Fathead minnow) Survival

Shapiro - Wilk's Test for Normality		Transform: Arc Sin(Square Root(Y))
<p>D = 0.1215 W = 0.7519 Critical W = 0.9 (alpha = 0.01, N = 30) Critical W = 0.927 (alpha = 0.05, N = 30)</p> <p>Data FAIL normality test (alpha = 0.01).</p>		

Steel's Many-One Rank Test				Transform: Arc Sin(Square Root(Y))	
Ho:Control<Treatment					
Group	Identification	Rank Sum	Critical Value	DF	Sig 0.05
1	Control				
2	32 %	22.50	16.00	5.00	
3	42 %	25.00	16.00	5.00	
4	56 %	25.00	16.00	5.00	
5	75 %	25.00	16.00	5.00	
6	100 %	27.50	16.00	5.00	
Critical values are 1 tailed (k=5)					

Appendix A2: Statistics

*Pimephales promelas* (Fathead minnow) Growth

Shapiro - Wilk's Test for Normality	No Transformation
<p>D = 0.04586 W = 0.9792 Critical W = 0.9 (alpha = 0.01, N = 30) Critical W = 0.927 (alpha = 0.05, N = 30)</p> <p>Data PASS normality test (alpha = 0.01).</p>	

Bartlett's Test for Homogeneity of Variance	No Transformation
<p>Calculated B1 statistic = 3.162 Critical B = 15.086 (alpha = 0.01, df = 5)</p> <p>Data PASS B1 homogeneity test at 0.01 level.</p>	

Appendix A2: Statistics

*Pimephales promelas* (Fathead minnow) Growth

ANOVA Table				No Transformation	
SOURCE	DF	SS	MS	F	
Between	5	0.02586	0.005172	2.706	
Within (Error)	24	0.04587	0.001911		
Total	29	0.07173			
Critical F = 3.9 (alpha = 0.01, df = 5,24)					
2.62 (alpha = 0.05, df = 5,24)					
Since F > Critical F REJECT Ho: All equal (alpha = 0.05)					

Dunnett's Test - Table 1 of 2					No Transformation	
Ho:Control<Treatment						
Group	Identification	Transformed Mean	Mean In Original Units	T Stat	Sig 0.05	
1	Control	0.4714	0.4714			
2	32 %	0.4308	0.4308	1.468		
3	42 %	0.4436	0.4436	1.006		
4	56 %	0.4664	0.4664	0.1808		
5	75 %	0.5096	0.5096	-1.382		
6	100 %	0.507	0.507	-1.288		
Dunnett's critical value = 2.36 (1 Tailed, alpha = 0.05, df = 5,24)						

Dunnett's Test - Table 2 of 2					No Transformation	
Ho:Control<Treatment						
Group	Identification	Num of Reps	Min Sig Diff (In Orig. Units)	% of Control	Difference From Control	
1	Control	5				
2	32 %	5	0.06525	13.8	0.0406	
3	42 %	5	0.06525	13.8	0.0278	
4	56 %	5	0.06525	13.8	0.005	
5	75 %	5	0.06525	13.8	-0.0382	
6	100 %	5	0.06525	13.8	-0.0356	

Appendix A2: Statistics

*Ceriodaphnia dubia* Survival

Fisher's Exact Test			
Identification	Dead	Alive	Total Animals
Control	1	9	10
32 %	0	10	10
Total	1	19	20

Critical Fisher's value (10,10,1) (alpha=0.05) is negative. b value is 0. NO SIGNIFICANT DIFFERENCE.

Fisher's Exact Test			
Identification	Dead	Alive	Total Animals
Control	1	9	10
42 %	0	10	10
Total	1	19	20

Critical Fisher's value (10,10,1) (alpha=0.05) is negative. b value is 0. NO SIGNIFICANT DIFFERENCE.

Fisher's Exact Test			
Identification	Alive	Dead	Total Animals
Control	9	1	10
56 %	9	1	10
Total	18	2	20

Critical Fisher's value (10,10,9) (alpha=0.05) is 4. b value is 9. Since b is greater than 4 there is NO SIGNIFICANT DIFFERENCE between CONTROL and TREATMENT at the 0.05 level.

Fisher's Exact Test			
Identification	Dead	Alive	Total Animals
Control	1	9	10
75 %	0	10	10
Total	1	19	20

Critical Fisher's value (10,10,1) (alpha=0.05) is negative. b value is 0. NO SIGNIFICANT DIFFERENCE.

Appendix A2: Statistics

*Ceriodaphnia dubia* Survival

Fisher's Exact Test			
Identification	Dead	Alive	Total Animals
Control	1	9	10
100 %	0	10	10
Total	1	19	20

Critical Fisher's value (10,10,1) (alpha=0.05) is negative. b value is 0. NO SIGNIFICANT DIFFERENCE.

Summary of Fisher's Exact Test				
Group	Identification	Exposed	Dead	Sig 0.05
0	Control	10	1	
1	32 %	10	0	
2	42 %	10	0	
3	56 %	10	1	
4	75 %	10	0	
5	100 %	10	0	

Appendix A2: Statistics

*Ceriodaphnia dubia* Reproduction

Chi-Square Test for Normality	No Transformation
Chi-Square = 15.322 Critical Chi-Square = 13.28	(alpha = 0.01, df = 4)
Data FAIL normality test (alpha = 0.01).	

Kolmogorov Test for Normality	No Transformation
D = 0.1255 D* = 0.9846 Critical D* = 1.035	(alpha = 0.01, N = 60)
Data PASS normality test (alpha = 0.01).	

Steel's Many-One Rank Test				No Transformation	
Ho:Control<Treatment					
Group	Identification	Rank Sum	Critical Value	DF	Sig 0.05
1	Control				
2	32 %	109.50	75.00	10.00	
3	42 %	102.50	75.00	10.00	
4	56 %	97.50	75.00	10.00	
5	75 %	102.50	75.00	10.00	
6	100 %	95.50	75.00	10.00	

Critical values are 1 tailed (k=5)

Appendix A2: Statistics

*Ceriodaphnia dubia* Reproduction

Dunnett's Test for PMSD Calculation (excluding deaths if applicable)

ANOVA Table				No Transformation	
SOURCE	DF	SS	MS	F	
Between	5	54.98	11	0.3758	
Within (Error)	52	1522	29.27		
Total	57	1577			
Critical F = 3.39 (alpha = 0.01, df = 5,52)					
2.39 (alpha = 0.05, df = 5,52)					
Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)					

Dunnett's Test - Table 1 of 2					No Transformation	
Ho:Control<Treatment						
Group	Identification	Transformed Mean	Mean In Original Units	T Stat	Sig 0.05	
1	Control	17.667	17.667			
2	32 %	17.3	17.3	0.1476		
3	42 %	16.4	16.4	0.5097		
4	56 %	15.333	15.333	0.9152		
5	75 %	16.4	16.4	0.5097		
6	100 %	14.9	14.9	1.113		
Dunnett's critical value = 2.31 (1 Tailed, alpha = 0.05, df [used] = 5,40) (Actual df = 5,52)						
WARNING - Unequal replicate sizes. Critical values assuming equal replicate sizes have been used.						

Dunnett's Test - Table 2 of 2					No Transformation	
Ho:Control<Treatment						
Group	Identification	Num of Reps	Min Sig Diff (In Orig. Units)	% of Control	Difference From Control	
1	Control	9				
2	32 %	10	5.742	32.5	0.367	
3	42 %	10	5.742	32.5	1.267	
4	56 %	9	5.891	33.3	2.334	
5	75 %	10	5.742	32.5	1.267	
6	100 %	10	5.742	32.5	2.767	



Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: July 24, 2012 at 0754  
Date and Time Test Terminated: July 31, 2012 at 1000

Effluent Conc.: Control		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.9	8.2	7.7	8.0	8.1	8.1	8.0
	Final *1	7.4	7.4	7.2	7.4	7.1	6.7	7.3
	Final *2	8.1	7.8	8.2	8.1	7.7	8.0	NA
pH, units	Initial	8.1	8.2	8.3	8.1	8.1	8.2	8.2
	Final *1	8.1	8.0	7.8	7.9	7.8	7.9	8.0
	Final *2	8.3	8.4	8.3	8.4	8.2	8.3	NA
Alkalinity, mg CaCO <sub>3</sub> /l		57	NA	57	NA	57	NA	NA
Hardness, mg CaCO <sub>3</sub> /l		85	NA	83	NA	82	NA	NA
Conductivity, umhos/cm		150	140	150	160	NA	230	210
Res. Chlorine, mg/l		<0.05	NA	<0.05	NA	<0.05	NA	NA

Effluent Conc.: 32 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.0	8.2	7.3	7.7	8.2	8.0	7.8
	Final *1	7.2	7.2	6.8	7.3	7.1	6.8	7.4
	Final *2	8.0	7.8	8.0	8.0	7.5	8.1	NA
pH, units	Initial	8.1	8.2	8.4	8.0	8.1	8.1	8.1
	Final *1	8.1	8.1	7.8	8.0	7.9	7.9	8.1
	Final *2	8.4	8.5	8.4	8.5	8.3	8.4	NA

Effluent Conc.: 42 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.1	7.8	7.6	7.6	8.1	7.8	7.6
	Final *1	7.1	6.8	6.9	7.3	7.1	6.7	7.3
	Final *2	7.9	7.7	7.8	8.2	7.5	8.0	NA
pH, units	Initial	8.1	8.2	8.4	8.0	8.1	8.1	8.1
	Final *1	8.1	8.0	7.9	8.0	7.9	8.0	8.1
	Final *2	8.4	8.6	8.4	8.5	8.4	8.4	NA

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: July 24, 2012 at 0754  
Date and Time Test Terminated: July 31, 2012 at 1000

Effluent Conc.: 56 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.0	7.9	7.8	7.8	8.0	8.1	7.7
	Final *1	7.2	6.8	7.5	7.1	7.2	6.3	7.0
	Final *2	7.9	7.9	8.0	8.2	8.0	8.0	NA
pH, units	Initial	8.1	8.2	8.5	8.0	8.1	8.1	8.3
	Final *1	8.2	8.1	8.1	8.0	8.0	8.0	8.1
	Final *2	8.5	8.6	8.5	8.5	8.4	8.5	NA

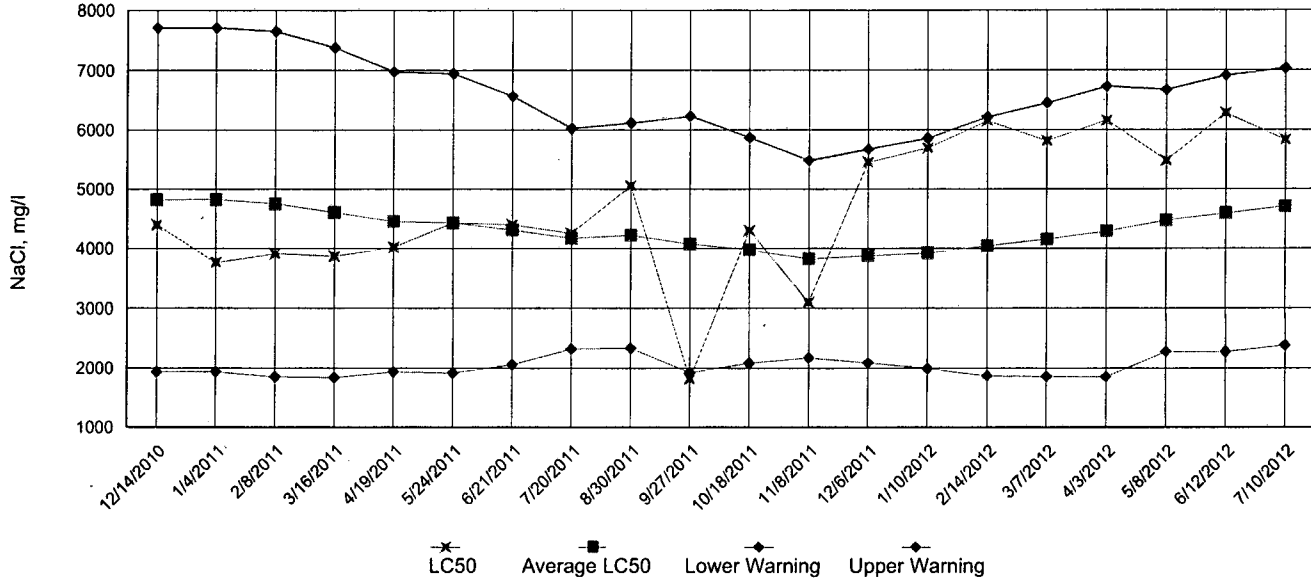
Effluent Conc.: 75 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.1	8.1	7.6	7.8	7.8	7.9	7.6
	Final *1	7.1	6.8	7.2	7.2	7.1	6.7	7.6
	Final *2	8.0	7.7	8.0	8.0	7.5	8.0	NA
pH, units	Initial	8.2	8.3	8.6	8.1	8.3	8.1	8.1
	Final *1	8.3	8.2	8.1	8.1	8.1	8.1	8.2
	Final *2	8.5	8.6	8.5	8.5	8.5	8.5	NA

Effluent Conc.: 100 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.2	8.0	7.7	8.8	7.8	8.0	8.0
	Final *1	7.0	7.1	7.0	7.1	7.0	6.6	7.8
	Final *2	7.7	7.8	8.1	8.0	7.6	8.1	NA
pH, units	Initial	8.1	8.2	8.6	8.1	8.1	8.3	8.1
	Final *1	8.0	8.3	8.2	8.2	8.1	8.2	8.3
	Final *2	8.6	8.7	8.6	8.6	8.6	8.6	NA
Alkalinity, mg CaCO <sub>3</sub> /l		180	NA	160	NA	170	NA	NA
Hardness, mg CaCO <sub>3</sub> /l		150	NA	150	NA	150	NA	NA
Conductivity, umhos/cm		420	410	420	400	570	580	550
Res. Chlorine, mg/l		<0.05	NA	<0.05	NA	<0.05	NA	NA

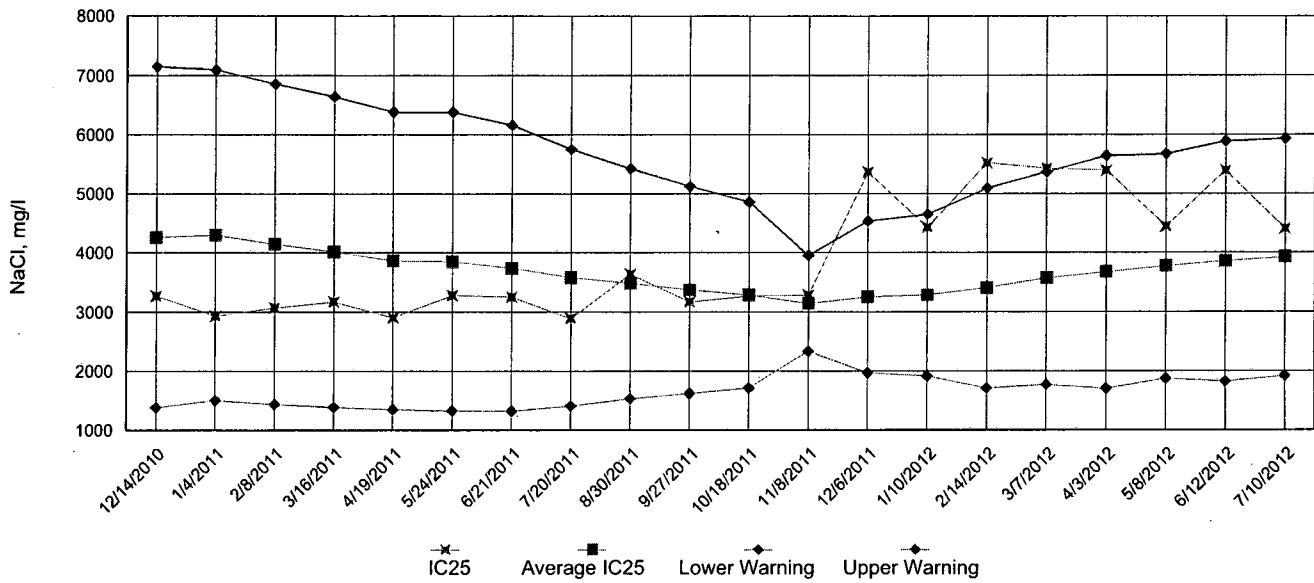
\*1 = data from the *Pimephales promelas* (Fathead Minnow) test      \*2 = data from the *Ceriodaphnia dubia* test

Appendix A4: Test 1000.0  
Chronic Reference Toxicant, *Pimephales promelas* (Fathead Minnow)

LC50 Survival Data

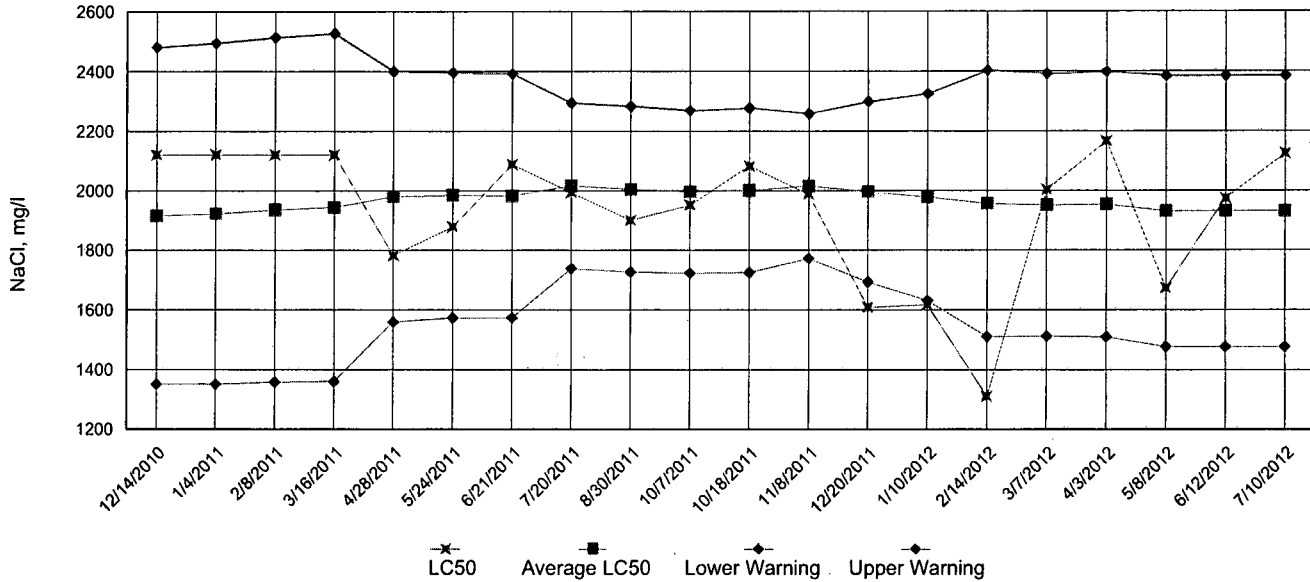


IC25 Growth Data

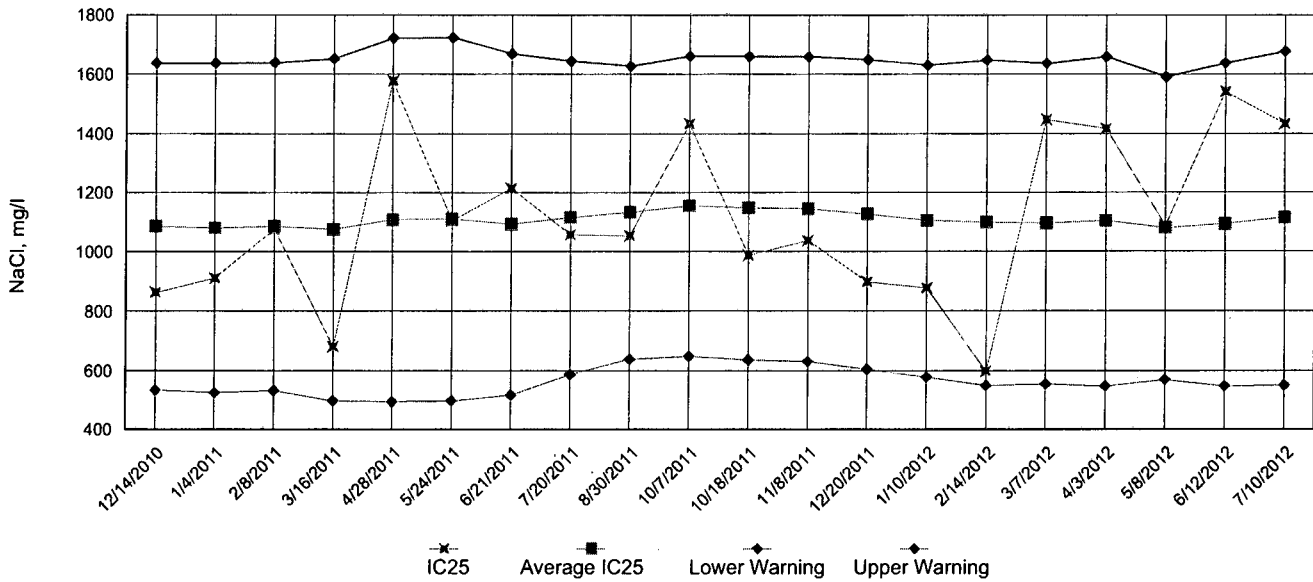


Appendix A4: Test 1002.0  
Chronic Reference Toxicant, *Ceriodaphnia dubia*

LC50 Survival Data



IC25 Reproduction Data



Appendix B: Test 1000.0

SUMMARY REPORTING FORMS  
CHRONIC BIOMONITORING  
*Pimephales promelas* (Fathead Minnow)  
SURVIVAL AND GROWTH

Permittee: City Water & Light of Jonesboro

NPDES No.: AR0043401 AFIN16-00936

Date and Time Test Initiated: July 24, 2012 at 1010

Date and Time Test Terminated: July 31, 2012 at 1000

Dilution water used: Synthetic Moderately Hard Water #3891

DATA TABLE FOR SURVIVAL

Effluent Conc. %	Percent Survival in replicate chambers					Mean percent survival			CV%
	A	B	C	D	E	24 hr	48 hr	7 days	
Control	100	100	100	100	100	100	100	100	0.00
32 %	87.5	100	87.5	100	100	97.5	97.5	95.0	7.21
42 %	87.5	100	100	100	100	100	100	97.5	5.73
56 %	87.5	100	100	100	100	100	100	97.5	5.73
75 %	87.5	100	100	100	100	100	97.5	97.5	5.73
100 %	100	100	100	100	100	100	100	100	0.00

DATA TABLE FOR GROWTH

Effluent Conc. %	Average dry weight, mg replicate chambers					Mean dry weight, mg	CV%
	A	B	C	D	E		
Control	0.422	0.460	0.505	0.521	0.449	0.471	8.66
32 %	0.430	0.474	0.341	0.474	0.435	0.431	12.6
42 %	0.382	0.465	0.432	0.439	0.500	0.444	9.82
56 %	0.426	0.435	0.429	0.530	0.512	0.466	10.8
75 %	0.491	0.525	0.508	0.488	0.536	0.51	4.10
100 %	0.500	0.481	0.585	0.478	0.491	0.507	8.77

CV = Coefficient of variation = standard deviation \* 100 / mean

Appendix B: Test 1000.0

SUMMARY REPORTING FORMS  
CHRONIC BIOMONITORING  
*Pimephales promelas* (Fathead Minnow)  
SURVIVAL AND GROWTH

1. Steel's Many-One Rank Test:

Is the mean survival significantly different ( $p=0.05$ ) than the control survival for the % effluent corresponding to (lethality):

a.) LOW FLOW OR CRITICAL DILUTION	(100 %)	_____ YES	<u>  X  </u> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	_____ YES	_____ NO

2. Dunnett's Test:

Is the mean dry weight (growth) significantly different ( $p=0.05$ ) than the control's dry weight (growth) for the % effluent corresponding to (significant non-lethal effects):

a.) LOW FLOW OR CRITICAL DILUTION	(100 %)	_____ YES	<u>  X  </u> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	_____ YES	_____ NO

- 3. If you answered NO to 1.a) enter [0] otherwise enter [1]:   0   (TLP6C)
- 4. If you answered NO to 2.a) enter [0] otherwise enter [1]:   0   (TGP6C)
- 5. NOEC Pimephales Lethality:  100 %  (TOP6C)
- 6. LOEC Pimephales Lethality:  100 %  (TXP6C)
- 7. NOEC Pimephales Sublethality:  100 %  (TPP6C)
- 8. LOEC Pimephales Sublethality:  100 %  (TYP6C)
- 9. Coefficient of variation for Pimephales growth:   8.77  (TQP6C)

TQP6C 9.0 ASU  
 8.77 AI  
 $2 \sqrt{17.77} \quad 8.88$   
 TQP3B 33.2 AI  
 17.3 ASU  
 $2 \sqrt{50.5} \quad 25.25$

Appendix B: Test 1000.0

CHRONIC TOXICITY SUMMARY FORM  
*Pimephales promelas* (Fathead minnow)  
CHEMICAL PARAMETERS CHART

PERMITTEE: City Water & Light of Jonesboro SAMPLE No. 1 COLLECTED ending: DATE: July 23, 2012 TIME: 0900  
 NPDES NO.: AR0043401 AFIN16-00936 SAMPLE No. 2 COLLECTED ending: DATE: July 25, 2012 TIME: 0900  
 CONTACT: Ms. Myra Taylor SAMPLE No. 3 COLLECTED ending: DATE: July 27, 2012 TIME: 0900  
 ANALYST: 275, 280, 298, 304 Test Initiated: DATE: July 24, 2012 TIME: 1010  
 Test Terminated: DATE: July 31, 2012 TIME: 1000

DILUTION	DAY						
	1	2	3	4	5	6	7
Control							
D.O. Initial	7.9	8.2	7.7	8.0	8.1	8.1	8.0
Final	7.4	7.4	7.2	7.4	7.1	6.7	7.3
pH Initial	8.1	8.2	8.3	8.1	8.1	8.2	8.2
Final	8.1	8.0	7.8	7.9	7.8	7.9	8.0
Alkalinity	57	NA	57	NA	57	NA	NA
Hardness	85	NA	83	NA	82	NA	NA
Conductivity	150	140	150	160	NA	230	210
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
32 %							
D.O. Initial	8.0	8.2	7.3	7.7	8.2	8.0	7.8
Final	7.2	7.2	6.8	7.3	7.1	6.8	7.4
pH Initial	8.1	8.2	8.4	8.0	8.1	8.1	8.1
Final	8.1	8.1	7.8	8.0	7.9	7.9	8.1
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	230	230	230	220	370	340	320
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
42 %							
D.O. Initial	8.1	7.8	7.6	7.6	8.1	7.8	7.6
Final	7.1	6.8	6.9	7.3	7.1	6.7	7.3
pH Initial	8.1	8.2	8.4	8.0	8.1	8.1	8.1
Final	8.1	8.0	7.9	8.0	7.9	8.0	8.1
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	260	250	260	250	420	370	350
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
56 %							
D.O. Initial	8.0	7.9	7.8	7.8	8.0	8.1	7.7
Final	7.2	6.8	7.5	7.1	7.2	6.3	7.0
pH Initial	8.1	8.2	8.5	8.0	8.1	8.1	8.3
Final	8.2	8.1	8.1	8.0	8.0	8.0	8.1
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	300	290	300	280	490	420	400
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
75 %							
D.O. Initial	8.1	8.1	7.6	7.8	7.8	7.9	7.6
Final	7.1	6.8	7.2	7.2	7.1	6.7	7.6
pH Initial	8.2	8.3	8.6	8.1	8.3	8.1	8.1
Final	8.3	8.2	8.1	8.1	8.1	8.1	8.2
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	350	340	350	330	580	480	460
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
100 %							
D.O. Initial	8.2	8.0	7.7	8.8	7.8	8.0	8.0
Final	7.0	7.1	7.0	7.1	7.0	6.6	7.8
pH Initial	8.1	8.2	8.6	8.1	8.1	8.3	8.1
Final	8.0	8.3	8.2	8.2	8.1	8.2	8.3
Alkalinity	180	NA	160	NA	170	NA	NA
Hardness	150	NA	150	NA	150	NA	NA
Conductivity	420	410	420	400	570	580	550
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

Appendix B: Test 1002.0  
SUMMARY REPORTING FORMS  
CHRONIC BIOMONITORING  
*Ceriodaphnia dubia*  
SURVIVAL AND REPRODUCTION

Permittee: City Water & Light of Jonesboro

NPDES No.: AR0043401 AFIN16-00936

Date and Time Test Initiated: July 24, 2012 at 1345

Date and Time Test Terminated: July 30, 2012 at 1305

Dilution water used: Synthetic Moderately Hard Water #3891

PERCENT SURVIVAL

Time of Reading	Control	Percent Effluent				
		32 %	42 %	56 %	75 %	100 %
24 hour	100	100	100	100	100	100
48 hour	100	100	100	100	100	100
6 day	90.0	100	100	90.0	100	100

NUMBER OF YOUNG PRODUCED PER FEMALE @ 6 DAYS

Replicates	Control	Percent Effluent				
		32 %	42 %	56 %	75 %	100 %
A	10	12	8	12	10	10
B	19	12	12	8	10	9
C	20	22	20	22	19	21
D	12	21	19	12	12	11
E	18	10	19	0	18	16
F	0	15	24	20	23	22
G	24	22	23	22	21	17
H	21	20	10	8	20	20
I	11	22	11	24	11	10
J	24	17	18	10	20	13
Mean per Adult	15.9	17.3	16.4	13.8	16.4	14.9
Mean per Surviving Adult	17.7	17.3	16.4	15.3	16.4	14.9
CV %	30.6	27.4	34.6	42.8	30.9	33.2

CV = Coefficient of variation = standard deviation \* 100 / mean  
(calculated based on young produced by surviving females)



Appendix B: Test 1002.0  
SUMMARY REPORTING FORMS  
CHRONIC BIOMONITORING  
*Ceriodaphnia dubia*  
SURVIVAL AND REPRODUCTION

1. Fisher's Exact Test:

Is the mean survival significantly different ( $p=0.05$ ) than the control survival for the % effluent corresponding to (lethality):

a.) LOW FLOW OR CRITICAL DILUTION	(100 %)	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<input type="checkbox"/> YES	<input type="checkbox"/> NO

2. Steel's Many-One Rank Test:

Is the mean number of young produced per female significantly different ( $p=0.05$ ) than the control's number of young per female for the % effluent corresponding to (significant non-lethal effects):

a.) LOW FLOW OR CRITICAL DILUTION	(100 %)	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<input type="checkbox"/> YES	<input type="checkbox"/> NO

3. If you answered NO to 1.a) enter [0] otherwise enter [1]: 0 (TLP3B)
4. If you answered NO to 2.a) enter [0] otherwise enter [1]: 0 (TGP3B)
5. NOEC *Ceriodaphnia* Lethality: 100 % (TOP3B)
6. LOEC *Ceriodaphnia* Lethality: 100 % (TXP3B)
7. NOEC *Ceriodaphnia* Sublethality: 100 % (TPP3B)
8. LOEC *Ceriodaphnia* Sublethality: 100 % (TYP3B)
9. Coefficient of variation for *Ceriodaphnia* Reproduction: 33.2 (TQP3B)

Appendix B: Test 1002.0

CHRONIC TOXICITY SUMMARY FORM  
*Ceriodaphnia dubia*  
CHEMICAL PARAMETERS CHART

PERMITTEE: City Water & Light of Jonesboro SAMPLE No. 1 COLLECTED ending: DATE: July 23, 2012 TIME: 0900  
 NPDES NO.: AR0043401 AFIN16-00936 SAMPLE No. 2 COLLECTED ending: DATE: July 25, 2012 TIME: 0900  
 CONTACT: Ms. Myra Taylor SAMPLE No. 3 COLLECTED ending: DATE: July 27, 2012 TIME: 0900  
 ANALYST: 275, 280, 298, 304 Test Initiated: DATE: July 24, 2012 TIME: 1345  
 Test Terminated: DATE: July 30, 2012 TIME: 1305

DILUTION	DAY						
	1	2	3	4	5	6	7
Control							
D.O. Initial	7.9	8.2	7.7	8.0	8.1	8.1	8.0
Final	8.1	7.8	8.2	8.1	7.7	8.0	NA
pH Initial	8.1	8.2	8.3	8.1	8.1	8.2	8.2
Final	8.3	8.4	8.3	8.4	8.2	8.3	NA
Alkalinity	57	NA	57	NA	57	NA	NA
Hardness	85	NA	83	NA	82	NA	NA
Conductivity	150	140	150	160	NA	230	210
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
32 %							
D.O. Initial	8.0	8.2	7.3	7.7	8.2	8.0	7.8
Final	8.0	7.8	8.0	8.0	7.5	8.1	NA
pH Initial	8.1	8.2	8.4	8.0	8.1	8.1	8.1
Final	8.4	8.5	8.4	8.5	8.3	8.4	NA
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	230	230	230	220	370	340	320
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
42 %							
D.O. Initial	8.1	7.8	7.6	7.6	8.1	7.8	7.6
Final	7.9	7.7	7.8	8.2	7.5	8.0	NA
pH Initial	8.1	8.2	8.4	8.0	8.1	8.1	8.1
Final	8.4	8.6	8.4	8.5	8.4	8.4	NA
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	260	250	260	250	420	370	350
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
56 %							
D.O. Initial	8.0	7.9	7.8	7.8	8.0	8.1	7.7
Final	7.9	7.9	8.0	8.2	8.0	8.0	NA
pH Initial	8.1	8.2	8.5	8.0	8.1	8.1	8.3
Final	8.5	8.6	8.5	8.5	8.4	8.5	NA
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	300	290	300	280	490	420	400
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
75 %							
D.O. Initial	8.1	8.1	7.6	7.8	7.8	7.9	7.6
Final	8.0	7.7	8.0	8.0	7.5	8.0	NA
pH Initial	8.2	8.3	8.6	8.1	8.3	8.1	8.1
Final	8.5	8.6	8.5	8.5	8.5	8.5	NA
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	350	340	350	330	580	480	460
Chlorine	NA	NA	NA	NA	NA	NA	NA

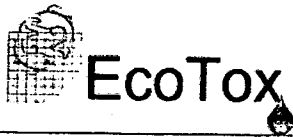
DILUTION	DAY						
	1	2	3	4	5	6	7
100 %							
D.O. Initial	8.2	8.0	7.7	8.8	7.8	8.0	8.0
Final	7.7	7.8	8.1	8.0	7.6	8.1	NA
pH Initial	8.1	8.2	8.6	8.1	8.1	8.3	8.1
Final	8.6	8.7	8.6	8.6	8.6	8.6	NA
Alkalinity	180	NA	160	NA	170	NA	NA
Hardness	150	NA	150	NA	150	NA	NA
Conductivity	420	410	420	400	570	580	550
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA





CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: <u>Jonesboro CWL</u>			PO No.		No of BOTTLES	Analyses Requested										AIC Control No: <u>159597</u>													
Project Reference: <u>Biomonitoring</u>			Sample Matrix													AIC Proposal No:													
Project Manager: <u>Myra Taylor</u>			G R A B	C O M P	W A T E R	S O I L	C - A M B I A	P - P R O M E T A S											Carrier:										
Sampled By: <u>Rodney Stephenson</u>																			Received Temperature °C <u>2°C</u>										
AIC No.	Sample Identification	Date/Time Collected																				Remarks							
<u>3</u>	<u>East Effluent</u>	<u>1/26-27/12</u> <u>10am - 9am</u>		<u>X</u>	<u>Y</u>			<u>X</u>	<u>Y</u>														<u>TCR - 0.03</u>						
																				Field pH calibration on _____ @ _____ Buffer:									
																				Container Type Preservative									
G = Glass NO = none					P = Plastic S = Sulfuric acid pH2					V = VOA vials N = Nitric acid pH2					H = HCl to pH2 B = NaOH to pH12					T = Sodium Thiosulfate Z = Zinc acetate									
Turnaround Time Requested: (Please circle) NORMAL or EXPEDITED IN _____ DAYS										Relinquished By: <u>[Signature]</u>					Date/Time: <u>7/27/12 2:28pm</u>					Received By: _____					Date/Time: _____				
Expedited results requested by: _____										Relinquished By: _____					Date/Time: _____					Received in Lab By: <u>[Signature]</u>					Date/Time: <u>7.27.12 2:28</u>				
Who should AIC contact with questions: _____										Comments:																			
Phone: _____ Fax: _____																													
Report Attention to: _____																													
Report Address to: _____																													



Ecotoxicology Research Facility



P.O. Box 847  
State University, AR 72467  
Tel. 870-972-2570  
Fax 870-972-2577  
<http://ecotox.astate.edu/>

College of Sciences & Mathematics  
[www.astate.edu](http://www.astate.edu)

August 9, 2012

Myra Taylor  
City Water & Light  
PO Box 1289  
Jonesboro, AR 72403

Dear Myra,

Please find enclosed the results of the 7-day chronic tests using water collected from Jonesboro's East plant facility during the week of July 23<sup>rd</sup>. Neither lethal nor sublethal effects measured in either *Pimephales promelas* or *Ceriodaphnia dubia* exposed to the critical flow concentration (100%) from this outfall. All test conditions and acceptability criteria as suggested by our laboratory and the US EPA were met during these tests.

Please call if you have any questions regarding this particular test series or any other tests conducted in the past.

Sincerely,

A handwritten signature in cursive script, appearing to read "Jennifer L. Bouldin".

Jennifer L. Bouldin, PhD  
Director Ecotoxicology Research Facility  
PO Box 847  
Arkansas State University  
State University, AR 72467



Toxicity Test Performed: 7-day *Pimephales promelas* Survival and Growth  
 Effluent Sampling Point: Jonesboro CWL East Plant  
 Date Test Started: 07/23/12 *P. promelas*  
 Time Test Started: 1411 *P. promelas*  
 Date Test Terminated: 07/30/12 *P. promelas*  
 Time Test Terminated: 1420 *P. promelas*  
 Laboratory Analyst: Rosado-Berrios

Toxicity Test Performed: 7-day *Ceriodaphnia dubia* Survival and Reproduction  
 Effluent Sampling Point: Jonesboro CWL East Plant  
 Date Test Started: 07/23/12 *C. dubia*  
 Time Test Started: 1400 *C. dubia*  
 Date Test Terminated: 07/30/12 *C. dubia*  
 Time Test Terminated: 1325 *C. dubia*  
 Laboratory Analyst: Griffin

## I. Test Methods

### A. Physical and Chemical Testing - APHA, Standard Methods for the Examination of Water and Wastewater; Vol. 21, 2005.

<u>Test</u>	<u>Method</u>
Alkalinity	2320B
Conductivity	2510B
Dissolved Oxygen (mg/L, DO)	4500-O-G
Hardness (mg/L CaCO <sub>3</sub> )	2340C
pH	4500-H <sup>+</sup> B
Temperature (°C)	2550B

### B. Toxicity Testing – EPA 821/R-02/013: Short Term Methods for Estimating the Chronic Toxicity of Effluents to Freshwater Organisms

<u>Test</u>	<u>Method</u>
Fathead Minnow Survival and Growth	Section 11
Cladoceran Survival and Reproduction	Section 13

## II. Test Organisms

- A. Name: *Pimephales promelas* (Fathead minnow)  
 Source: Laboratory Culture  
 Age: <24 hours  
 Life Stage: Larval



B. Name: *Ceriodaphnia dubia* (Cladoceran)

Source: Laboratory Culture

Age: &lt;24 hours

Life Stage: Neonate

## III. External Factors

## A. Incubator

Temperature (°C)

Average: 25.4

Range: 25.0 – 25.5

Light Cycle: 16 hours light/ 8 hours dark

Light Intensity: 100 footcandles

Control Water: Moderately Hard Synthetic Water (MH# 870/871)

B. *Pimephales promelas*

Test Chambers: 250 ml storage dishes

Volume per Chamber: 200 ml

Number of Organisms per Chamber: 8

Number of Replicates per Concentration: 5

Acclimation: Laboratory control water was added to cultures until &gt;50% of the culture water consisted of control water.

Food: Larval fish were fed 0.15ml of laboratory-cultured *Artemia* brine shrimp one hour prior to test setup and then 3X daily thereafter.C. *Ceriodaphnia dubia*

Test Chambers: 30 ml Solo cups

Volume per Chamber: 15-20 ml

Number of Organisms per Chamber: 1

Number of Replicates per Concentration: 10

Acclimation: Laboratory control water was added to cultures until &gt;50% of the culture water consisted of control water.

Food: Cladocera were fed *Selenastrum* (#ABS 062712) and yeast/cereal/trout chow mix (#YCT 060612-9/10/11) one hour prior to test setup and once daily thereafter.

## IV. Quality Assurance

## A. Standard Toxicant: Sodium Chloride

B. Organism: *Pimephales promelas*

Date of Reference Toxicant Test

Start: 07/03/12

Terminated: 07/10/12

Time of Reference Toxicant Test

Start: 1155

Terminated: 1145

Laboratory Analyst: Freyaldenhoven

Dilution Water Used: Moderately Hard Synthetic Water #867

Results: Survival and Growth within control limits

Survival

LOEC: 4.22 g/L NaCl

EC50: 4.63 g/L NaCl

Growth

LOEC: &gt;5.63 g/L NaCl

IC25: &gt;5.63 g/L NaCl

C. Organism: *Ceriodaphnia dubia*

Date and time of Reference Toxicant Test

Start: 07/05/12

Terminated: 07/13/12

Time of Reference Toxicant Test

Start: 1515

Terminated: 1515

Laboratory Analyst: Freyaldenhoven

Dilution Water Used: Moderately Hard Synthetic Water #867

Results: Survival and Reproduction within control limits

Survival

LOEC: 2.60 g/L NaCl

EC50: 1.77 g/L NaCl

Reproduction

LOEC: 0.62 g/L NaCl

IC25: 1.04 g/L NaCl

V. Physical and Chemical Data - See Attached

VI. Survival and Growth Data - See Attached

VII. Statistical Methods - See Attached

VIII. NPDES Permit Results - See Attached

## SUMMARY REPORTING FORM

### WET Testing

#### Fathead Minnow Larvae (*Pimephales promelas*) Survival and Growth

Permittee: Jonesboro CWL East Plant

NPDES No.: AR0043401

		<u>Time</u>	<u>Date</u>	to	<u>Time</u>	<u>Date</u>
Composite 1:	Collected from	1000	07/22/12		0900	07/23/12
Composite 2:	Collected from	1000	07/24/12		0900	07/25/12
Composite 3:	Collected from	1000	07/26/12		0900	07/27/12

Test Initiated: 1400

Date: 07/23/12

Time Terminated: 1420

Date: 07/30/12

Dilution H<sub>2</sub>O: MH 870/871

#### DATA TABLE FOR SURVIVAL

Effluent Conc. %	% Survival in					Mean % Survival			CV%
	Replicate Chambers					24h	48h	7days	
	A	B	C	D	E				
Control	*	100	100	100	100	100	100	100	0.0
32	87.5	100	100	100	87.5	100	97.5	95	7.6
42	87.5	100	100	100	100	100	100	97.5	6.1
56	100	87.5	100	100	100	100	100	97.5	6.1
75	100	100	87.5	100	100	100	100	97.5	6.1
100	87.5	100	87.5	87.5	87.5	97.5	92.5	90.0	6.6

\*Broken beaker-lost fish

#### DATA TABLE FOR GROWTH

Effluent Conc %	Average Dry Weight in					Mean Dry Weight (mg)	CV%
	Replicate Chambers (mg)						
	A	B	C	D	E		
Control	*	0.5512	0.5875	0.5625	0.5675	0.5672	2.7
32	0.6429	0.5462	0.5750	0.6513	0.6871	0.6205	9.4
42	0.6257	0.5725	0.5962	0.5975	0.6225	0.6029	3.6
56	0.5600	0.6643	0.6575	0.5863	0.6888	0.6314	8.7
75	0.5575	0.5700	0.6213	0.5763	0.6313	0.5913	5.6
100	0.5743	0.6212	0.5871	0.7000	0.5657	0.6097	9.0

\*Broken beaker-lost fish

Coefficient of Variation = Standard Deviation x 100/Mean

## Fathead Minnow Larvae (*Pimephales promelas*) Survival and Growth

### 1. FISHER'S EXACT TEST:

Is the mean survival for the critical dilution (100%) at 7 days significantly different ( $p=0.05$ ) than the control survival?

\_\_\_\_ Yes  X  No

### 2. DUNNETT'S PROCEDURE OR STEEL'S MANY-ONE RANK TEST AS APPROPRIATE:

Is the mean growth by *P. promelas* in the critical dilution (100%) significantly different ( $p=0.05$ ) than the growth in control exposures?

\_\_\_\_ Yes  X  No

3. If the NOEC for survival is less than the critical dilution, enter [1], otherwise enter [0] for parameter #TGP6C:  0

4. If the NOEC for growth is less than the critical dilution, enter [1], otherwise enter [0] for parameter #TLP6C:  0

5. Report the NOEC value for survival, Parameter #TOP6C:  
NOEC survival  100  % effluent

6. Report the NOEC value for growth, Parameter #TPP6C:  
NOEC growth  100  % effluent

7. Report the % coefficient of variation (largest of low flow and control dilutions), Parameter #TQP6C: CV % growth  9.0 %  (critical)

## Whole Effluent Lethality Values

1. Report the Whole Effluent Lethality values for the 30-Day average minimum, Parameter #22414:

Daily Average Minimum NOEC:  100%

2. Report the Whole Effluent Lethality values for the 7-day minimum, Parameter #22414:

7-Day Minimum NOEC:  100%

**WET Testing Summary Form**  
**Fathead Minnow Larvae (*Pimephales promelas*)**

**Chemical Parameters Chart**

Permittee: Jonesboro CWL East Plant  
 NPDES No.: AR0043401  
 Contact: Myra Taylor  
 Analyst: Rosado-Berrios

Sample No. 1 Collected Ending Date: 07/23/12 Time: 0900  
 Sample No. 2 Collected Ending Date: 07/25/12 Time: 0900  
 Sample No. 3 Collected Ending Date: 07/27/12 Time: 0900  
 Test Begin: Date: 07/23/12 Time: 1400 Test End: Date: 07/30/12 Time: 1420

**Initial Water Chemistry for Chronic Tests**

Project: CWL EAST (Jonesboro) – <i>C. dubia</i> / <i>P. promelas</i>								
Test day		1	2	3	4	5	6	7
Date		7/23/2012	7/24/2012	7/25/2012	7/26/2012	7/27/2012	7/28/2012	7/29/2012
H <sub>2</sub> O #		MH 870	MH 870	MH 870	MH 870	MH 871	MH 871	MH 871
Temp (°C)	Control	23.0	22.5	23.0	23.0	22.5	22.9	23.0
	32%	23.0	22.7	23.0	23.1	22.5	23.0	23.0
	42%	23.0	22.7	23.0	23.0	22.8	22.9	23.0
	56%	23.2	22.7	23.0	23.0	23.0	23.0	23.0
	75%	23.6	23.0	23.0	23.0	23.5	23.0	23.0
	100%	23.4	23.0	23.0	23.0	23.5	23.0	23.0
pH (Standard Units)	Control	7.73	7.70	7.70	7.81	7.83	7.78	7.74
	32%	7.64	7.70	7.59	7.79	7.77	7.89	7.99
	42%	7.67	7.75	7.57	7.79	7.76	7.91	7.97
	56%	7.66	7.76	7.56	7.79	7.70	7.98	8.00
	75%	7.81	7.70	7.68	7.72	7.66	7.99	8.06
	100%	7.94	7.68	7.69	7.66	7.63	7.98	8.06
DO (mg/L)	Control	8.0	8.5	8.1	8.4	8.6	8.3	8.4
	32%	8.3	8.2	8.7	8.3	8.7	8.0	8.0
	42%	8.3	8.2	8.9	8.2	8.6	8.0	8.3
	56%	8.2	8.3	8.6	8.1	8.8	8.1	8.2
	75%	8.0	8.4	8.3	8.3	8.8	8.0	8.2
	100%	8.4	8.9	8.3	8.3	8.6	8.3	8.4
Cond (µS/cm)	Control	311	311	311	312	314	316	311
	32%	445	458	458	461	469	473	465
	42%	506	507	508	507	510	522	515
	56%	561	573	577	578	580	594	581
	75%	652	661	666	668	688	691	671
	100%	778	776	786	784	819	816	793
Alk (mg/L)	Control	62		62		64		
	100%	142		142		130		
Hard (mg/L)	Control	90		90		90		
	100%	150		150		190		

**WET Testing Summary Form**  
**Fathead Minnow Larvae (*Pimephales promelas*)**

**Chemical Parameters Chart**

Permittee: Jonesboro CWL East Plant

Sample No. 1 Collected Ending Date: 07/23/12 Time: 0900

NPDES No.: AR0043401

Sample No. 2 Collected Ending Date: 07/25/12 Time: 0900

Contact: Myra Taylor

Sample No. 3 Collected Ending Date: 07/27/12 Time: 0900

Analyst: Rosado-Berrios

Test Begin: Date: 07/23/12 Time: 1400 Test End: Date: 07/30/12 Time: 1420

Final Water Chemistry for Chronic Tests								
Project: CWL EAST (Jonesboro)– <i>P. promelas</i>								
Test day		1	2	3	4	5	6	7
Date		7/24/2012	7/25/2012	7/26/2012	7/27/2012	7/28/2012	7/29/2012	7/30/2012
H <sub>2</sub> O #		MH 870	MH 870	MH 870	MH 870	MH 871	MH 871	MH 871
Temp (°C)	Control	22.5	23.5	23.3	23.5	23.0	23.3	24.1
	32%	22.5	23.5	23.0	23.5	23.0	23.5	24.6
	42%	22.5	23.5	23.0	23.5	23.1	23.5	24.9
	56%	22.8	23.5	23.0	24.0	22.8	23.0	25.0
	75%	22.5	23.6	23.0	24.0	23.0	23.5	25.1
	100%	22.5	23.6	23.1	24.0	23.1	23.5	24.9
pH (Standard Units)	Control	7.78	7.53	7.35	7.18	7.64	7.53	7.21
	32%	7.88	7.64	7.54	7.45	7.59	7.65	7.41
	42%	7.93	7.68	7.56	7.52	7.68	7.70	7.48
	56%	7.99	7.75	7.66	7.62	7.77	7.77	7.61
	75%	8.08	7.79	7.69	7.65	7.85	7.91	7.75
	100%	8.14	7.90	7.80	7.75	7.94	7.96	7.87
DO (mg/L)	Control	7.5	6.7	5.6	5.1	7.3	5.6	6.1
	32%	7.5	6.5	5.7	5.4	6.2	5.2	6.2
	42%	7.1	5.9	5.4	4.9	6.2	5.2	6.2
	56%	6.9	6.0	5.8	5.1	6.6	5.1	6.6
	75%	7.0	5.8	5.1	5.1	6.6	5.8	6.3
	100%	7.0	5.8	5.9	5.0	6.8	5.5	6.4

**SUMMARY REPORTING FORM**  
**WET Testing**  
***Ceriodaphnia dubia* Survival and Reproduction**

Permittee: Jonesboro CWL East Plant

NPDES No.: AR0043401

		<u>Time</u>	<u>Date</u>		<u>Time</u>	<u>Date</u>
Composite 1:	Collected from	1000	07/22/12	to	0900	07/23/12
Composite 2:	Collected from	1000	07/24/12	to	0900	07/25/12
Composite 3:	Collected from	1000	07/26/12	to	0900	07/27/12

Test Initiated: 1400

Date: 07/23/12

Time Terminated: 1325

Date: 07/30/12

Dilution H<sub>2</sub>O: MH 870/871

**PERCENT SURVIVAL**  
Percent Effluent

<u>Time of Reading</u>	<u>Control</u>	<u>32%</u>	<u>42%</u>	<u>56%</u>	<u>75%</u>	<u>100%</u>
24h	100	100	100	100	100	100
48h	100	100	100	100	100	100
7 day	100	80	100	100	90	100

**NUMBER OF YOUNG/FEMALE @ 7 DAYS**

<u>REP</u>	<u>0%</u>	<u>32%</u>	<u>42%</u>	<u>56%</u>	<u>75%</u>	<u>100%</u>
A	21	18	28	27	22	28
B	23	23	25	26	25	21
C	21	25	25	22	24	29
D	11	29	23	23	20	27
E	21	25	20	23	27	23
F	18	22	21	30	27	28
G	21	X/0	26	29	24	23
H	21	30	24	22	X/0	27
I	20	26	25	30	28	29
J	23	X/3	21	26	23	21
<b>Mean</b>	<b>20.0</b>	<b>24.8</b>	<b>23.8</b>	<b>25.8</b>	<b>24.4</b>	<b>25.6</b>
<b>CV%*</b>	<b>17.3</b>	<b>15.5</b>	<b>10.6</b>	<b>12.4</b>	<b>10.7</b>	<b>12.7</b>

\*Coefficient of Variation% = Standard Deviation x 100/Mean

### *Ceriodaphnia dubia* Survival and Reproduction

1. FISHER'S EXACT TEST:

Is the mean survival for the critical dilution (100%) at 7 days significantly different ( $p=0.05$ ) than the control survival?

Yes  No

2. DUNNETT'S PROCEDURE OR STEEL'S MANY-ONE RANK TEST AS APPROPRIATE:

Is the mean number of young produced per female by the critical dilution (100%) significantly different ( $p=0.05$ ) than the control's number of young per female?

Yes  No

3. If the NOEC for survival is less than the critical dilution, enter [1], otherwise enter [0] for parameter #TGP3B: 0

4. If the NOEC for reproduction is less than the critical dilution, enter [1], otherwise enter [0] for parameter #TLP3B: 0

5. Report the NOEC value for survival, Parameter #TOP3B:  
NOEC survival 100 % effluent

6. Report the NOEC value for reproduction, Parameter #TPP3B:  
NOEC reproduction 100 % effluent

7. Report the % coefficient of variation (largest of low flow and control dilutions), Parameter #TQP3B:  
CV % reproduction 17.3% (control)

### Whole Effluent Lethality Values for *Ceriodaphnia dubia*

1. Report the Whole Effluent Lethality values for the 30-Day average minimum, Parameter #22414:  
Daily Average Minimum NOEC: 100%

2. Report the Whole Effluent Lethality values for the 7-day minimum, Parameter #22414: 7-Day  
Minimum NOEC: 100%



**WET Testing Summary Form**  
***Ceriodaphnia dubia* (Cladoceran)**  
**Chemical Parameters Chart**

Permittee: Jonesboro CWL East Plant

Sample No. 1 Collected Ending Date: 07/23/12 Time: 0900

NPDES No.: AR0043401

Sample No. 2 Collected Ending Date: 07/25/12 Time: 0900

Contact: Myra Taylor

Sample No. 3 Collected Ending Date: 07/27/12 Time: 0900

Analyst: Griffin

Test Begin: Date: 07/23/12 Time: 1400 Test End: Date: 07/30/12 Time: 1325

**Initial Water Chemistry for Chronic Tests**

Project: CWL EAST (Jonesboro) – *C. dubia/P. promelas*

Test day		1	2	3	4	5	6	7
Date		7/23/2012	7/24/2012	7/25/2012	7/26/2012	7/27/2012	7/28/2012	7/29/2012
H <sub>2</sub> O #		MH 870	MH 870	MH 870	MH 870	MH 871	MH 871	MH 871
Temp (°C)	Control	23.0	22.5	23.0	23.0	22.5	22.9	23.0
	32%	23.0	22.7	23.0	23.1	22.5	23.0	23.0
	42%	23.0	22.7	23.0	23.0	22.8	22.9	23.0
	56%	23.2	22.7	23.0	23.0	23.0	23.0	23.0
	75%	23.6	23.0	23.0	23.0	23.5	23.0	23.0
	100%	23.4	23.0	23.0	23.0	23.5	23.0	23.0
pH (Standard Units)	Control	7.73	7.70	7.70	7.81	7.83	7.78	7.74
	32%	7.64	7.70	7.59	7.79	7.77	7.89	7.99
	42%	7.67	7.75	7.57	7.79	7.76	7.91	7.97
	56%	7.66	7.76	7.56	7.79	7.70	7.98	8.00
	75%	7.81	7.70	7.68	7.72	7.66	7.99	8.06
	100%	7.94	7.68	7.69	7.66	7.63	7.98	8.06
DO (mg/L)	Control	8.0	8.5	8.1	8.4	8.6	8.3	8.4
	32%	8.3	8.2	8.7	8.3	8.7	8.0	8.0
	42%	8.3	8.2	8.9	8.2	8.6	8.0	8.3
	56%	8.2	8.3	8.6	8.1	8.8	8.1	8.2
	75%	8.0	8.4	8.3	8.3	8.8	8.0	8.2
	100%	8.4	8.9	8.3	8.3	8.6	8.3	8.4
Cond (µS/cm)	Control	311	311	311	312	314	316	311
	32%	445	458	458	461	469	473	465
	42%	506	507	508	507	510	522	515
	56%	561	573	577	578	580	594	581
	75%	652	661	666	668	688	691	671
	100%	778	776	786	784	819	816	793
Alk (mg/L)	Control	62		62		64		
	100%	142		142		130		
Hard (mg/L)	Control	90		90		90		
	100%	150		150		190		

**WET Testing Summary Form**  
***Ceriodaphnia dubia* (Cladoceran)**

**Chemical Parameters Chart**

Permittee: Jonesboro CWL East Plant

Sample No. 1 Collected Ending Date: 07/23/12 Time: 0900

NPDES No.: AR0043401

Sample No. 2 Collected Ending Date: 07/25/12 Time: 0900

Contact: Myra Taylor

Sample No. 3 Collected Ending Date: 07/27/12 Time: 0900

Analyst: Griffin

Test Begin: Date: 07/23/12 Time: 1400 Test End: Date: 07/30/12 Time: 1325

Final Water Chemistry for Chronic Tests								
Project: CWL EAST (Jonesboro) – <i>C. dubia</i>								
Test day		1	2	3	4	5	6	7
Date		7/24/2012	7/25/2012	7/26/2012	7/27/2012	7/28/2012	7/29/2012	7/30/2012
H <sub>2</sub> O #		MH 870	MH 870	MH 870	MH 870	MH 871	MH 871	MH 871
Temp	Control	23.5	23.0	22.8	23.5	23.7	23.0	24.2
	32%	23.5	23.0	22.8	23.5	23.9	23.0	23.9
	42%	23.5	23.0	22.8	23.5	23.5	23.0	23.6
	56%	23.5	23.0	22.9	23.3	23.8	23.0	23.7
	75%	23.5	23.0	22.9	23.3	23.8	23.0	23.6
	100%	23.5	23.0	22.9	23.3	23.9	23.0	23.7
pH (Standard Units)	Control	7.92	8.15	7.74	7.82	7.94	7.95	8.07
	32%	8.08	8.18	7.94	7.89	8.12	8.18	8.12
	42%	8.16	8.25	8.02	8.37	8.18	8.28	8.33
	56%	8.16	8.25	8.05	8.14	8.19	8.28	8.23
	75%	8.28	8.28	8.17	8.50	8.29	8.42	8.42
	100%	8.25	8.34	8.20	8.20	8.30	8.40	8.40
DO (mg/L)	Control	8.1	8.0	7.3	8.0	7.8	8.3	8.0
	32%	8.6	8.4	7.3	8.0	7.4	7.6	7.9
	42%	8.2	8.1	8.3	8.6	7.7	7.6	7.9
	56%	8.3	7.6	7.3	8.2	7.3	7.7	7.7
	75%	8.3	8.0	6.6	8.8	7.6	7.7	7.9
	100%	8.2	7.6	7.2	8.5	7.4	7.3	7.7

**Larval Fish Growth and Survival Test-7 Day Survival**

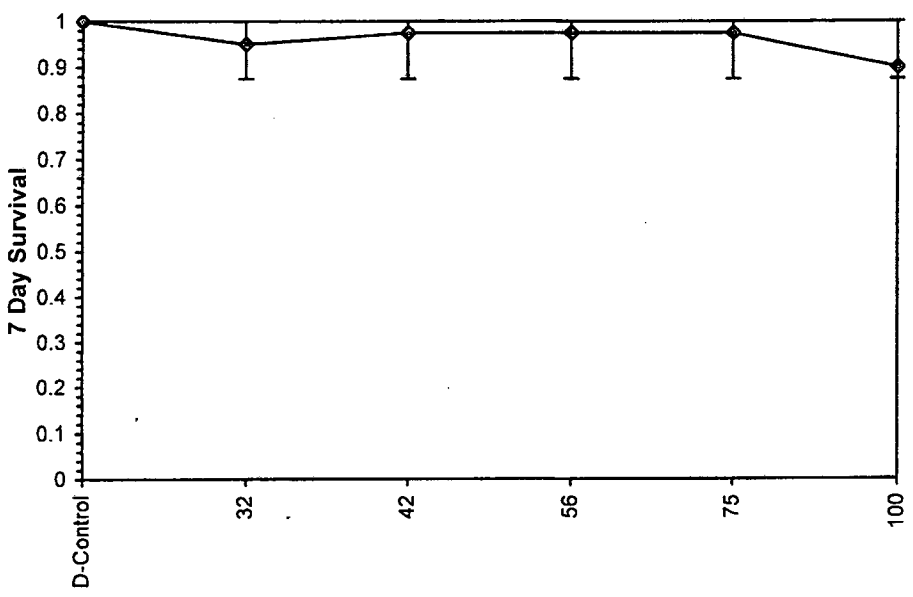
Start Date: 7/23/2012 14:00 Test ID: Jul-12 Sample ID: NPDES Permit #AR0043401  
 End Date: 7/30/2012 14:20 Lab ID: ASU ERF Sample Type: EFF1-POTW  
 Sample Date: 07/22/12 Protocol: EPAF 02-EPA Freshwater Test Species: PP-Pimephales promelas  
 Comments: 3rd Quarter WET Testing

Conc-%	1	2	3	4	5
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000
32	0.8750	1.0000	1.0000	1.0000	0.8750
42	0.8750	1.0000	1.0000	1.0000	1.0000
56	1.0000	0.8750	1.0000	1.0000	1.0000
75	1.0000	0.8750	1.0000	1.0000	1.0000
100	0.8750	1.0000	0.8750	0.8750	0.8750

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root					Rank Sum	1-Tailed Critical
			Mean	Min	Max	CV%	N		
D-Control	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	4		
32	0.9500	0.9500	1.3196	1.2094	1.3931	7.623	5	21.00	15.00
42	0.9750	0.9750	1.3564	1.2094	1.3931	6.055	5	23.00	15.00
56	0.9750	0.9750	1.3564	1.2094	1.3931	6.055	5	23.00	15.00
75	0.9750	0.9750	1.3564	1.2094	1.3931	6.055	5	23.00	15.00
100	0.9000	0.9000	1.2462	1.2094	1.3931	6.591	5	17.00	15.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.87347	0.898	-0.739	0.23437
Equality of variance cannot be confirmed				
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Wilcoxon Rank Sum Test	100	>100		1

**Dose-Response Plot**



**Larval Fish Growth and Survival Test-7 Day Growth**

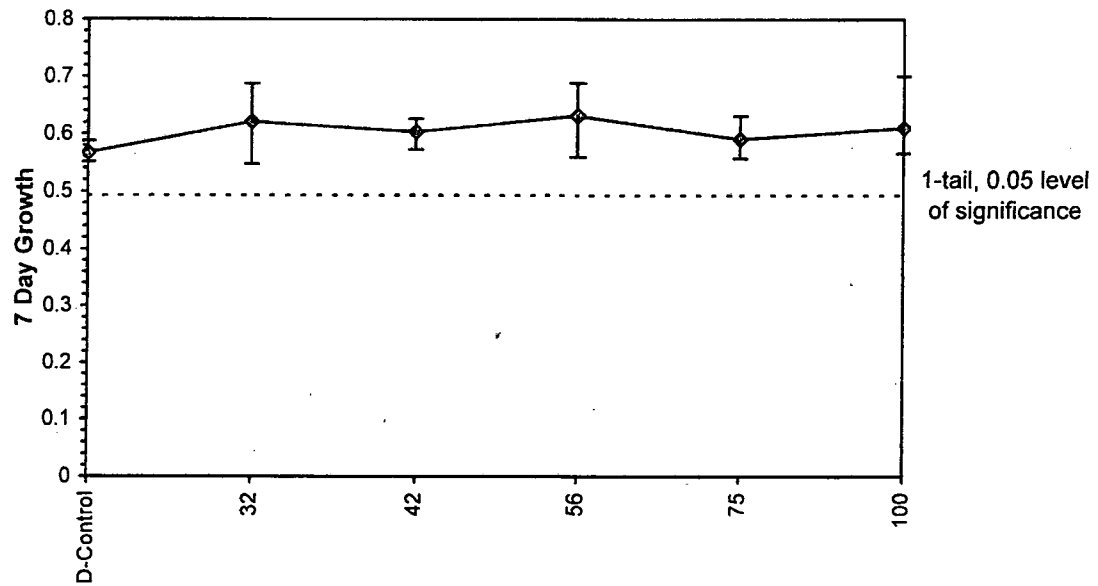
Start Date: 7/23/2012 14:00 Test ID: Jul-12 Sample ID: NPDES Permit #AR0043401  
 End Date: 7/30/2012 14:20 Lab ID: ASU ERF Sample Type: EFF1-POTW  
 Sample Date: 07/22/12 Protocol: EPAF 02-EPA Freshwater Test Species: PP-Pimephales promelas  
 Comments: 3rd Quarter WET Testing

Conc-%	1	2	3	4	5
D-Control	0.5512	0.5875	0.5625	0.5675	
32	0.6429	0.5462	0.5750	0.6513	0.6871
42	0.6257	0.5725	0.5962	0.5975	0.6225
56	0.5600	0.6643	0.6575	0.5863	0.6888
75	0.5575	0.5700	0.6213	0.5763	0.6313
100	0.5743	0.6212	0.5871	0.7000	0.5657

Conc-%	Mean	N-Mean	Transform: Untransformed					1-Tailed		
			Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	0.5672	1.0000	0.5672	0.5512	0.5875	2.671	4			
32	0.6205	1.0940	0.6205	0.5462	0.6871	9.352	5	-1.806	2.500	0.0738
42	0.6029	1.0630	0.6029	0.5725	0.6257	3.617	5	-1.209	2.500	0.0738
56	0.6314	1.1131	0.6314	0.5600	0.6888	8.743	5	-2.174	2.500	0.0738
75	0.5913	1.0424	0.5913	0.5575	0.6313	5.555	5	-0.815	2.500	0.0738
100	0.6097	1.0749	0.6097	0.5657	0.7000	8.978	5	-1.439	2.500	0.0738

Auxiliary Tests	Statistic	Critical	Skew	Kurt						
Shapiro-Wilk's Test indicates normal distribution ( $p > 0.01$ )	0.98117	0.898	0.15264	-0.2614						
Bartlett's Test indicates equal variances ( $p = 0.17$ )	7.78749	15.0863								
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	100	>100		1	0.0738	0.13012	0.00229	0.00194	0.34727	5, 23

**Dose-Response Plot**



**CHRONIC TEST DATA SHEET**

*Pimephales promelas*

Project: CWL EAST (Jonesboro) Beginning Date: 072312 Time: 1400 Test Species: P. promelas

Dilution H<sub>2</sub>O: MH870 Ending Date: 073012 Time: 1420 Age: <24h \* it broke  
MH871

Test Type: ( \* )Static Renewal ( ) Flowthrough Toxicant/Effluent

Conc.	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Pan #
Control	1	8/0	8/0	8/0	8/0	* -			
	2	8/0	8/0	8/0	8/0	8/0	8/0	8/0	CWL E-2
	3	8/0	8/0	8/0	8/0	8/0	8/0	8/0	3
	4	8/0	8/0	8/0	8/0	8/0	8/0	8/0	4
	5	8/0	8/0	8/0	8/0	8/0	8/0	8/0	5
32%	1	8/0	8/0	8/0	8/0	8/0	8/0	7/0 <sup>MH</sup>	6
	2	8/0	8/0	8/0	8/0	8/0	8/0	8/0	7
	3	8/0	8/0	8/0	8/0	8/0	8/0	8/0	8
	4	8/0	8/0	8/0	8/0	8/0	8/0	8/0	9
	5	8/0	8/1	7/0	7/0	7/0	7/0	7/0	10
42%	1	8/0	8/0	8/0	8/0	8/0	8/1	7/0	11
	2	8/0	8/0	8/0	8/0	8/0	8/0	8/0	12
	3	8/0	8/0	8/0	8/0	8/0	8/0	8/0	13
	4	8/0	8/0	8/0	8/0	8/0	8/0	8/0	14
	5	8/0	8/0	8/0	8/0	8/0	8/0	8/0	15
56%	1	8/0	8/0	8/0	8/0	8/0	8/0	8/0	16
	2	8/0	8/0	8/0	8/0	8/0	8/0	7/0 <sup>MH</sup>	17
	3	8/0	8/0	8/0	8/0	8/0	8/0	8/0	18
	4	8/0	8/0	8/0	8/0	8/0	8/0	8/0	19
	5	8/0	8/0	8/0	8/0	8/0	8/0	8/0	20
Date		072412	072512	072612	072712	072812	072912	073012	073012
Initials		CARB	CARB	CARB	MF	CARB	CARB	MF	MF

**CHRONIC TEST DATA SHEET**

*Pimephales promelas*

Project: CWL (Jonesboro) Beginning Date: 072312 Time: 1400 Test Species: P. promelas

Dilution H<sub>2</sub>O: MH870 Ending Date: 073012 Time: 1420 Age: < 24h  
MH871

Test Type: ( \* )Static Renewal ( ) Flowthrough Toxicant/Effluent

Conc.	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Pan #
75%	1	8/0	8/0	8/0	8/0	8/0	8/0	8/0	21
	2	8/0	8/0	8/0	8/0	8/0	8/0	7/0 <sup>HF</sup>	22
	3	8/0	8/0	8/0	8/0	8/0	8/0	8/0	23
	4	8/0	8/0	8/0	8/0	8/0	8/0	8/0	24
	5	8/0	8/0	8/0	8/0	8/0	8/0	8/0	25
100%	1	8/0	8/0	8/0	8/0	8/0	8/0	8/1	26
	2	8/0	8/0	8/0	8/0	8/0	8/0	8/0	27
	3	8/0	7/0	7/0	7/0	7/0	8/0	7/0	28
	4	8/0	8/0	8/0	8/0	8/0	8/1	7/0	29
	5	8/0	8/0	8/0	8/0	8/0	8/1	7/0	30
Date		072412	072512	072612	072712	072812	072912	073012	073012
Initials		CARB	CARB	CARB	HF	CARB	CARB	HF	HF

072312 | 071412 T. 1, 7, 10, 12, 13, 14, 16, 17  
 071512 T. 1, 3, 6, 10, 14, 16, 20  
 AF: 1602 | 071612 T. 3, 5, 13, 16, 20  
 BF 1050 | 071712 T. 3, 5, 8, 10, 13, 19  
 071812 T. 4, 7, 8, 9, 10, 14, 17, 18, 20, 23

**Ceriodaphnia Survival and Reproduction Test-7 Day Survival**

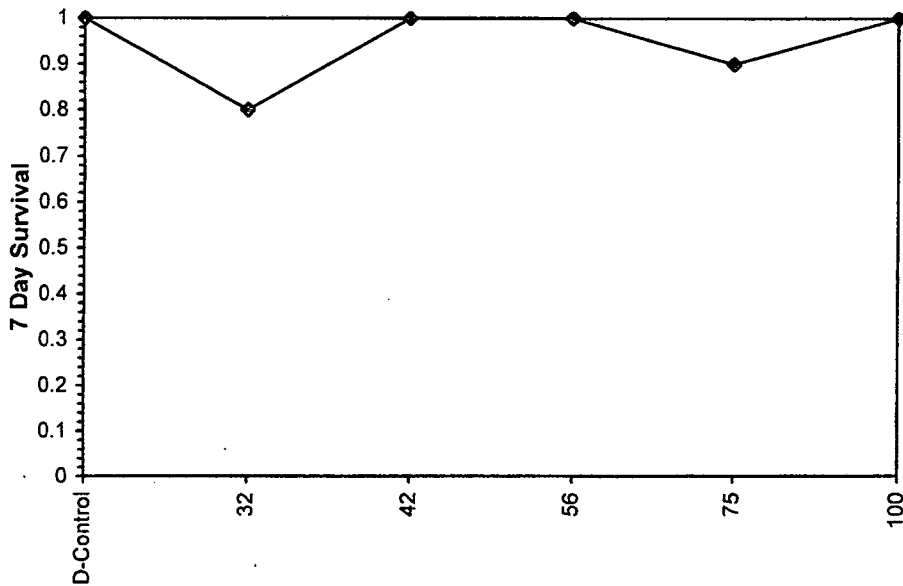
Start Date: 7/23/2012 14:00 Test ID: Jul-12 Sample ID: NPDES Permit #AR0043401  
 End Date: 7/30/2012 13:25 Lab ID: ASU ERF Sample Type: EFF1-POTW  
 Sample Date: 07/22/12 Protocol: EPAF 02-EPA Freshwater Test Species: CD-Ceriodaphnia dubia  
 Comments: 3rd Quarter WET Testing

Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
32	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	0.0000
42	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
56	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
75	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000
100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Conc-%	Mean	N-Mean	Resp	Not Resp	Total	N	Fisher's Exact P	1-Tailed Critical
D-Control	1.0000	1.0000	0	10	10	10		
32	0.8000	0.8000	2	8	10	10	0.2368	0.0500
42	1.0000	1.0000	0	10	10	10	1.0000	0.0500
56	1.0000	1.0000	0	10	10	10	1.0000	0.0500
75	0.9000	0.9000	1	9	10	10	0.5000	0.0500
100	1.0000	1.0000	0	10	10	10	1.0000	0.0500

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	100	>100		1

**Dose-Response Plot**



**Ceriodaphnia Survival and Reproduction Test-Reproduction**

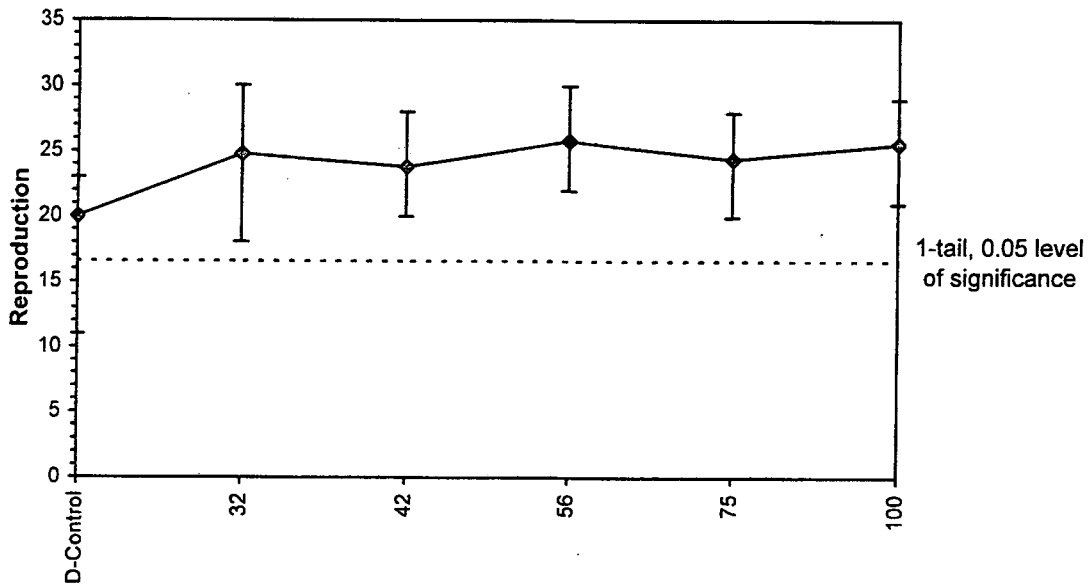
Start Date: 7/23/2012 14:00 Test ID: Jul-12 Sample ID: NPDES Permit #AR0043401  
 End Date: 7/30/2012 13:25 Lab ID: ASU ERF Sample Type: EFF1-POTW  
 Sample Date: 07/22/12 Protocol: EPAF 02-EPA Freshwater Test Species: CD-Ceriodaphnia dubia  
 Comments: 3rd Quarter WET Testing

Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	21.000	23.000	21.000	11.000	21.000	18.000	21.000	21.000	20.000	23.000
32	18.000	23.000	25.000	29.000	25.000	22.000	30.000	26.000		
42	28.000	25.000	25.000	23.000	20.000	21.000	26.000	24.000	25.000	21.000
56	27.000	26.000	22.000	23.000	23.000	30.000	29.000	22.000	30.000	26.000
75	22.000	25.000	24.000	20.000	27.000	27.000	24.000	28.000	23.000	
100	28.000	21.000	29.000	27.000	23.000	28.000	23.000	27.000	29.000	21.000

Conc-%	Mean	N-Mean	Transform: Untransformed					N	t-Stat	1-Tailed Critical	MSD
			Mean	Min	Max	CV%					
D-Control	20.000	1.0000	20.000	11.000	23.000	17.321	10				
32	24.750	1.2375	24.750	18.000	30.000	15.536	8	-3.169	2.402	3.600	
42	23.800	1.1900	23.800	20.000	28.000	10.630	10	-2.689	2.402	3.394	
56	25.800	1.2900	25.800	22.000	30.000	12.365	10	-4.104	2.402	3.394	
75	24.444	1.2222	24.444	20.000	28.000	10.650	9	-3.061	2.402	3.487	
100	25.600	1.2800	25.600	21.000	29.000	12.651	10	-3.962	2.402	3.394	

Auxiliary Tests				Statistic	Critical	Skew	Kurt						
Kolmogorov D Test indicates normal distribution (p > 0.01)				0.9407	1.035	-0.6165	0.17739						
Bartlett's Test indicates equal variances (p = 0.85)				2.00123	15.0863								
Hypothesis Test (1-tail, 0.05)				NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test				100	>100		1	3.39428	0.16971	44.9215	9.98671	0.0018	5, 51

**Dose-Response Plot**





**CHRONIC TEST DATA SHEET**  
*Ceriodaphnia dubia*

Project: CWL EAST (Jonesboro) Beginning Date: 072312 Time: 1400 Test Species: C. dubia

Dilution H<sub>2</sub>O: MH870 Ending Date: 073012 Time: 1325 Age: < 24h  
MH871

Test Type: (  ) Static Renewal (  ) Flowthrough Toxicant/Effluent: \_\_\_\_\_

Conc.	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Neonates
Control	1	0	0	0	5	0	8	8	21
	2	↓	↓	↓	6	0	8	9	23
	3	↓	↓	↓	4	0	8	9	21
	4	↓	↓	↓	3	0	8	0	11
	5	↓	↓	↓	4	0	7	10	21
	6	↓	↓	↓	4	6	0	8	18
	7	↓	↓	↓	4	0	8	9	21
	8	↓	↓	↓	5	0	8	8	21
	9	↓	↓	↓	5	0	8	7	20
	10	↓	↓	↓	4	1	7	11	23
32%	1	4	0	0	5	0	7	6	18
	2	↓	↓	↓	5	0	8	10	23
	3	↓	↓	↓	5	0	8	12	25
	4	↓	↓	↓	5	0	11	13	29
	5	↓	↓	↓	5	0	7	13	25
	6	↓	↓	↓	4	0	8	10	22
	7	↓	↓	↓	X/0	_____	_____	_____	X/0
	8	↓	↓	↓	6	0	8	16	30
	9	↓	↓	↓	4	0	9	13	26
	10	↓	↓	↓	3	X/0	_____	_____	X/3
Date		072412	072512	072612	072712	072812	072912	073012	080212
Initials		TB	LN4	LN5	LN6	HF	HF	TB	LN4



**CHRONIC TEST DATA SHEET**

*Ceriodaphnia dubia*

Project: CWL EAST (Jonesboro) Beginning Date: <sup>072312</sup>~~072412~~ Time: 1400 Test Species: C. dubia  
TB

Dilution H<sub>2</sub>O: <sup>M#570</sup>~~M#571~~ Ending Date: 073012 Time: 1325 Age: <24h

Test Type: ( \* )Static Renewal ( ) Flowthrough Toxicant/Effluent: \_\_\_\_\_

Conc.	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Neonates
75%	1	0	0	0	5	0	8	9	22
	2	↓	↓	↓	4	1	10	10	25
	3	↓	↓	↓	5	0 <sub>HF</sub>	9	9	24
	4	↓	↓	↓	4	0 <sub>HF<sub>B</sub></sub>	0	8	20
	5	↓	↓	↓	5	8 <sub>HF</sub>	9	13	27
	6	↓	↓	↓	5	0	9	13	27
	7	↓	↓	↓	4	0	10	10	24
	8	↓	↓	X/10	—	—	—	—	— <sub>N6</sub>
	9	↓	↓	0	6	0	10	12	28
	10	↓	↓	↓	5	7	1	10	23
100%	1	0	0	0	5	0	11	12	28
	2	↓	↓	↓	5	0	9	7	21
	3	↓	↓	↓	6	0	9	14	29
	4	↓	↓	↓	5	8	0	14	27
	5	↓	↓	↓	5	0	9	9	23
	6	↓	↓	↓	5	0	10	13	28
	7	↓	↓	↓	5	8	0	10	23
	8	↓	↓	↓	5	0	10	12	27
	9	↓	↓	↓	5	0	9	15	29
	10	↓	↓	↓	5	7	9	0	21
Date		072412	072512	072612	072712	072812	072912	073012	080212
Initials		TB	MG	MG	MG	HF	HF	TB	MG

**Initial Water Chemistry for Chronic Tests**  
Project: CWL EAST (Jonesboro) - *C.dubia*/*P. promelas*

Test Day		0	1	2	3	4	5	6
Date		072312	072412	072512	072612	072712	072812	072912
H <sub>2</sub> O Batch #		MH870	MH870	MH870	MH870	MH871	MH871	MH871
Temp. (°C)	Control	22.5	22.5	23.0	23.0	22.5	22.9	23.0
	32%	23.0	22.7	23.0	23.1	22.9	23.0	23.0
	42%	23.0	22.7	23.0	23.0	22.8	22.9	23.0
	56%	23.2	22.7	23.0	23.0	23.0	23.0	23.0
	75%	23.3	23.0	23.0	23.0	24.4 <sup>HF</sup> 22.9	23.0	23.0
	100%	23.4	23.0	23.0	23.0	23.5	23.0	23.0
pH	Control	7.73	7.70	7.75 <sup>HF</sup> 7.70	7.81	7.83	7.78	7.74
	32%	7.64	7.70	7.59	7.79	7.77	7.89	7.99
	42%	7.67	7.75	7.57	7.79	7.76	7.91	7.97
	56%	7.66	7.76	7.56	7.79	7.70	7.98	8.00
	75%	7.81	7.70	7.68	7.72	7.66	7.99	8.06
	100%	7.94	7.68	7.71 <sup>HF</sup> 7.69	7.66	7.63	7.98	8.06
DO (mg/L)	Control	8.0	8.5	8.1	8.4	8.6	8.2	8.4
	32%	8.3	8.2	8.7	8.3	8.7	8.0	8.0
	42%	8.3	8.2	8.9	8.2	8.6	8.0	8.3
	56%	8.2	8.3	8.6	8.1	8.8	8.1	8.2
	75%	8.0	8.4	8.3	8.3	8.8	8.0	8.2
	100%	8.4	8.4	8.3	8.3	8.6	8.3	8.4
Cond. (µS/cm)	Control	311	311	311	312	314	316	311
	32%	445	458	458	461	469	473	465
	42%	506	507	508	507	510	522	515
	56%	561	573	577	578	580	594	581
	75%	652	661	666	668	688	691	671
	100%	778	776	786	784	819	816	793
Alk. (mg/L)	Control	142		142		144		
	100%	142		142		170		
Hard. (mg/L)	Control	90		90		90		
	100%	150		150		190		
Initials		MF/TR	TR/MG	MF/MG	TB	MF/MG	MF	MF

22.5  
22.5  
22.5  
23.0

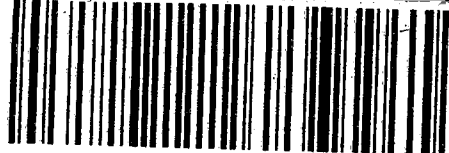
**Final Water Chemistry for Chronic Tests**  
Project: CWL EAST (Jonesboro) - *P. promelas*

Test Day:		1	2	3	4	5	6	7
Date:		07/24/12	07/25/12	07/26/12	07/27/12	09/28/12	09/29/12	10/30/12
H <sub>2</sub> O Batch #:		MH870/HP	MH870	MH870	MH870	MH871	MH871	MH871
Temp. (°C)	Control	22.5	23.5	23.3	23.5	23.0 <sup>used</sup> <sub>23.0</sub>	23.3	24.1
	32%	22.5	23.5	23.0	23.5	23.0	23.5	24.6
	42%	22.5	23.5	23.0	23.5	23.1	23.5	24.9
	56%	22.8	23.5	23.0	24.0	22.8	23.0	25.0
	75%	22.5	23.6	23.0	24.0	23.0	23.5	25.1
	100%	22.5	23.6	23.1	24.0	23.1	23.5	24.9
pH	Control	7.78	7.53	7.35	7.18	7.64	7.53	7.21
	32%	7.88	7.64	7.54	7.45	7.59	7.65	7.41
	42%	7.93	7.68	7.56	7.52	7.68	7.70	7.48
	56%	7.99	7.75	7.66	7.62	7.77	7.77	7.61
	75%	8.08	7.79	7.69	7.65	7.85	7.91	7.75
	100%	8.14	7.90	7.80	7.75	7.94	7.96	7.87
DO (mg/L)	Control	7.5	6.7	5.6	5.1	7.3	5.6	6.1
	32%	7.5	6.5	5.7	5.4	6.2	5.2	6.2
	42%	7.1	5.9	5.4	4.9	6.2	5.2	6.2
	56%	6.9	6.0	5.8	5.1	6.6	5.1	6.6
	75%	7.0	5.8	5.1	5.1	6.6	5.8	6.3
	100%	7.0	5.8	5.9	5.0	6.8	5.5	6.4
Initials		HP	CARB	TB	HP	CARB	CARB	TB HP

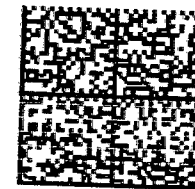
**Final Water Chemistry for Chronic Tests**  
Project: CWL EAST (Jonesboro) - *C. dubia*

Test Day:		1	2	3	4	5	6	7
Date:		072412	072512	072612	072712	072812	072912	073012
H <sub>2</sub> O Batch #:		M4870	M4870	M4870	M4870	M4871	M4871	M4871
Temp. (°C)	Control	23.5	23.0	22.9	23.5	23.1	23.0	24.2
	32%	23.5	23.0	22.9	23.5	23.9	23.0	23.9
	42%	23.5	23.0	22.9	23.5	23.5	23.0	23.6
	56%	23.5	23.0	22.9	23.3	23.8	23.0	23.7
	75%	23.5	23.0	22.9	23.3	23.8	23.0	23.4
	100%	23.5	23.0	22.9	23.3	23.9	23.0	23.7
pH	Control	7.92	8.15	7.74	7.82	7.94	7.95	8.07
	32%	8.08	8.18	7.94	7.89	8.12	8.18	8.12
	42%	8.16	8.25	8.02	8.37	8.18	8.28	8.33
	56%	8.16	8.25	8.05	8.14	8.19	8.28	8.23
	75%	8.28	8.28	8.17	8.50	8.29	8.42	8.42
	100%	8.25	8.24	8.20	8.20	8.30	8.40	8.40
DO (mg/L)	Control	8.1	8.0	7.3	8.0	7.8	8.3	8.0
	32%	8.6	8.4	7.3	8.0	7.4	7.6	7.9
	42%	8.2	8.1	8.3	8.6	7.7	7.6	7.9
	56%	8.3	7.6	7.3	8.2	7.3	7.7	7.7
	75%	8.3	8.0	6.10	8.8	7.6	7.7	7.9
	100%	8.2	7.6	7.2	8.5	7.4	7.3	7.7
Initials:		PTB, MG, MQ	MG	MG, HF	HF	HF	TR	

City Water & Light  
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5301 Northshore Drive  
North Little Rock, AR 72118

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