

June 12, 2015

Test Results of  
Second Quarter  
Chronic 7-Day Renewal  
Biomonitoring Testing  
for  
Outfall 001  
Huntsville, AR

Control No. 191022-1

Prepared for:

Mr. Bill Eoff  
Huntsville Water Utilities  
Post Office Box 430  
Huntsville, AR 72740

Prepared by:

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Huntsville Water Utilities  
ATTN: Mr. Bill Eoff  
Post Office Box 430  
Huntsville, AR 72740

Re: Chronic 7-Day Renewal utilizing *Pimephales promelas* (Fathead minnow) and *Ceriodaphnia dubia*  
Outfall 001 - Huntsville, AR  
NPDES Permit No. AR0022004 AFIN# 44-00018

Dear Mr. Bill Eoff:

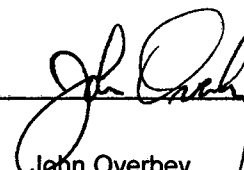
This report is the analytical results and supporting information for the samples submitted to American Interplex Corporation (AIC). The following results are applicable only to the sample identified by the control number referenced above. Accurate assessment of the data requires access to the entire 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: Huntsville Water Utilities  
ATTN: Mr. Bill Eoff  
bill9eoff@hotmail.com

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I. Control Acceptance Criteria

*Pimephales promelas* (Fathead minnow) Method 1000.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	97.5	PASS
Control Growth > or = 0.25 mg per Surviving minnow	0.307	PASS
Control Growth CV < or = 40%	10.5	PASS
Growth Minimum Significant Difference 12 to 30%	15.2	PASS
Critical Dilution CV < or = 40%	10.1	PASS

*Ceriodaphnia dubia* Method 1002.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	100	PASS
Control Reproduction > or = 15 per Surviving Female	24.4	PASS
Control CV < or = 40% per Surviving Female	14.2	PASS
Reproduction Minimum Significant Difference 13 to 47%	24.7	PASS
Critical Dilution CV < or = 40%	35.3	PASS

II. Outlined Report

A. Introduction

1. Permit Number: AR0022004 AFIN# 44-00018
2. Test Requirements: Chronic Biomonitoring, Quarterly  
Test Methods 1000.0 and 1002.0
3. Receiving Stream: White River Basin

B. Source of Effluent/Dilution Water

1. Effluent Samples:

- a. Sampling Point: Outfall 001
- b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	7.0	7.1	7.5
pH (standard units)	7.5	7.7	7.5
Alkalinity (mg/l as CaCO <sub>3</sub> )	100	110	140
Hardness (mg/l as CaCO <sub>3</sub> )	160	160	150
Conductivity (umhos/cm)	600	600	800
Residual Chlorine (mg/l)	<0.05	<0.05	<0.05
Ammonia as N (mg/l)	<0.1	<0.1	2.7

2. Dilution Water Samples: Synthetic Moderately Hard Water #4218

- a. Dates Prepared: May 19 through June 2, 2015
- b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	7.3	7.6	7.6
pH (standard units)	7.7	7.9	7.8
Alkalinity (mg/l as CaCO <sub>3</sub> )	60	60	61
Hardness (mg/l as CaCO <sub>3</sub> )	80	80	82
Conductivity (umhos/cm)	280	280	270
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: June 2, 2015 at 1135  
Date & Time Test Terminated: June 9, 2015 at 1020  
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: June 2, 2015 at 1135  
Date & Time Test Terminated: June 9, 2015 at 1145  
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 Bartlett's test and analyzed with Dunnett's 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 May 26, 2015 at 1450 to June 2, 2015 at 1315

The results were as follows: (Control No. 190396-1.)

Survival LC-50: 1884 mg/l

Growth IC-25: 2236 mg/l

Growth PMSD: 17.9

*Ceriodaphnia dubia*

Chronic reference tests are performed monthly.

A chronic reference test was performed on May 13, 2015 at 1730 to May 19, 2015 at 1630

The results were as follows: (Control No. 190396-2.)

Survival LC-50: 1732 mg/l

Growth IC-25: 928.9 mg/l

Growth PMSD: 12

V. Chemical Analysis/Quality Control

Parameter	Method	% Recovery	Relative % Difference
Alkalinity	SM 2320 B	NA	0.00
Hardness	EPA 200.7	97.7	0.309
pH	SM 4500-H+ B	101	0.00
Conductivity	EPA 120.1	91.8	7.83

VI. Organism History

*Pimephales promelas* (Fathead minnow)

Date: June 2, 2015

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: June 2, 2015

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

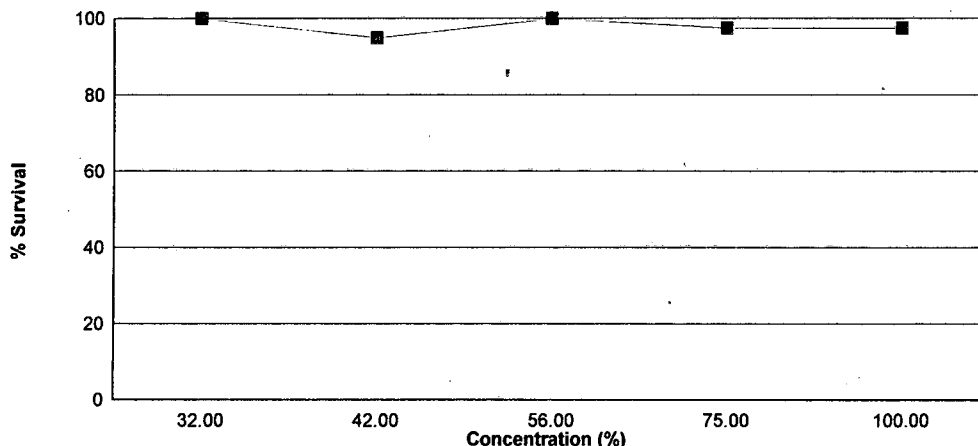
Larvae are exposed in a static renewal system for seven days to different concentrations of effluent with dilution water. Test results are based on the survival and growth (increase in weight) of the larvae.

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 June 2, 2015 at 1135 and continued through June 9, 2015 at 1020. 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	97.5	0.299
32 %	100	0.289
42 %	95.0	0.292
56 %	100	0.291
75 %	97.5	0.364
100 %	97.5	0.357

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

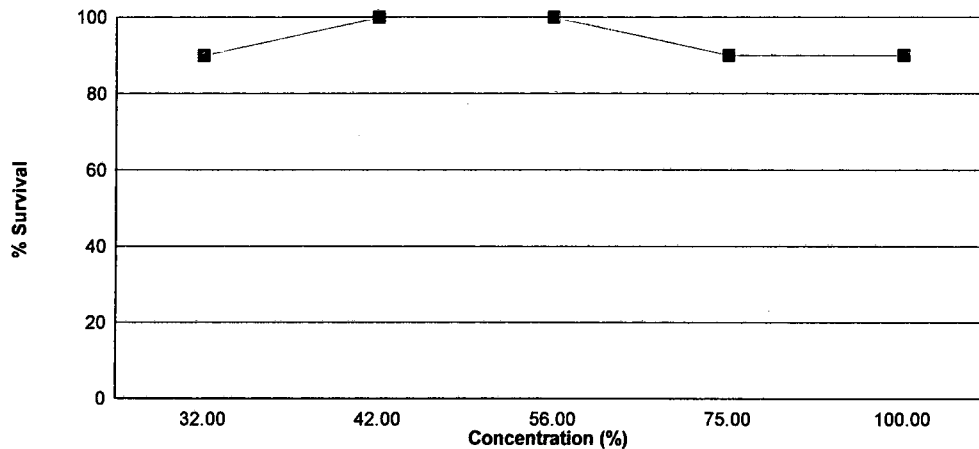
Neonates are exposed in a static renewal system to different concentrations of effluent with dilution water until 60% of surviving control organisms have three broods of offspring with an average of at least 15 young per female.

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 June 2, 2015 at 1135 and continued through June 9, 2015 at 1145. 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



Summary of the 7-day <i>Ceriodaphnia dubia</i> Survival and Reproduction Data		
Concentration	Percent Survival	Mean Reproduction
Control	100	24.4
32 %	90.0	17.7
42 %	100	21.9
56 %	100	18.4
75 %	90.0	19.0
100 %	90.0	18.3



Appendix A1: Test 1000.0

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

Date and Time Test Initiated: June 2, 2015 at 1135

Date and Time Test Terminated: June 9, 2015 at 1020

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	7	7	7	7	7	7	7
32 %	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
42 %	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	8	8
	C	8	8	8	7	6	6	6
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
56 %	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
75 %	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	8	8
	C	8	8	8	8	7	7	7
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
100 %	A	7	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

Appendix A1: Test 1000.0

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

Test Initiated: June 2, 2015 at 1135  
Test Terminated: June 9, 2015 at 1020

Drying Started: June 3, 2015 at 1435  
Drying Ended: June 10, 2015 at 1130

Concentration	Replicate	Weight of pan	Weight of pan + fish	Total weight of fish (g)	Original # of fish	Mean dry weight (mg)
Control	A	.93774	.94036	0.00262	8	0.328
	B	.93628	.93869	0.00241	8	0.301
	C	.93656	.93895	0.00239	8	0.299
	D	.94045	.94302	0.00257	8	0.321
	E	.93540	.93738	0.00198	8	0.248
32 %	A	.93918	.94122	0.00204	8	0.255
	B	.93686	.93924	0.00238	8	0.298
	C	.93409	.93637	0.00228	8	0.285
	D	.93462	.93714	0.00252	8	0.315
	E	.93525	.93757	0.00232	8	0.290
42 %	A	.93673	.93946	0.00273	8	0.341
	B	.93802	.94041	0.00239	8	0.299
	C	.94242	.94458	0.00216	8	0.270
	D	.94275	.94481	0.00206	8	0.258
	E	.94160	.94392	0.00232	8	0.290
56 %	A	.93869	.94075	0.00206	8	0.258
	B	.94521	.94739	0.00218	8	0.272
	C	.93617	.93847	0.00230	8	0.288
	D	.93763	.94039	0.00276	8	0.345
	E	.94287	.94522	0.00235	8	0.294
75 %	A	.93660	.93934	0.00274	8	0.342
	B	.93832	.94130	0.00298	8	0.372
	C	.94322	.94590	0.00268	8	0.335
	D	.93901	.94197	0.00296	8	0.370
	E	.93774	.94095	0.00321	8	0.401
100 %	A	.93375	.93645	0.00270	8	0.338
	B	.93266	.93531	0.00265	8	0.331
	C	.93205	.93467	0.00262	8	0.328
	D	.94186	.94487	0.00301	8	0.376
	E	.94007	.94336	0.00329	8	0.411

Appendix A1: Test 1002.0

*Ceriodaphnia dubia* Survival and Reproduction

Date and Time Test Initiated: June 2, 2015 at 1135

Date and Time Test Terminated: June 9, 2015 at 1145

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	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	0	0	0	0	0	0	0	0	10	0.00
4	4	4	4	5	3	4	4	6	3	5	42	10	4.20	
5	8	9	9	10	8	8	10	12	8	11	93	10	9.30	
6	0	0	0	0	0	0	0	0	8	0	8	10	0.800	
7	11	12	10	12	11	10	10	13	0	12	101	10	10.1	
8														
TOTAL	23	25	23	27	22	22	24	31	19	28	244	10	24.4	

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	0	0	10	0.00	
4	3	2	3	3	2	2X	4	3	2	5	29	9	3.22	
5	8	8	0	6	9	X	6	3	11	7	58	9	6.44	
6	0	0	0	0	0	X	0	0	0	0	0	9	0.00	
7	10	12	10	9	11	X	9	7	12	10	90	9	10.0	
8														
TOTAL	21	22	13	18	22	2	19	13	25	22	177	10	17.7	

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	0	0	0	0	0	0	0	0	0	10	0.00	
4	3	2	2	3	3	3	5	4	2	2	29	10	2.90	
5	11	6	7	8	12	5	9	8	7	6	79	10	7.90	
6	0	0	0	0	0	0	0	0	0	10	10	10	1.00	
7	13	9	9	11	14	10	13	11	11	0	101	10	10.1	
8														
TOTAL	27	17	18	22	29	18	27	23	20	18	219	10	21.9	

Appendix A1: Test 1002.0

*Ceriodaphnia dubia* Survival and Reproduction

Date and Time Test Initiated: June 2, 2015 at 1135

Date and Time Test Terminated: June 9, 2015 at 1145

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	0	0	0	0	0	0	0	0	10	0.00
4	4	2	3	3	2	4	3	4	2	4	31	10	3.10	
5	8	5	0	4	3	8	9	0	7	7	51	10	5.10	
6	0	0	0	0	0	0	0	0	0	0	0	10	0.00	
7	10	9	4	11	15	11	5	14	13	10	102	10	10.2	
8														
TOTAL	22	16	7	18	20	23	17	18	22	21	184	10	18.4	

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	0	0	0	0	0	0	0	0	0	10	0.00	
4	4	2	3	3	3	3	6	2	3	4	33	10	3.30	
5	9	7	4	8	7	0	9	7	8	6	65	10	6.50	
6	X	0	0	0	0	0	0	0	0	0	0	9	0.00	
7	X	13	0	10	12	0	15	14	15	13	92	9	10.2	
8														
TOTAL	13	22	7	21	22	3	30	23	26	23	190	10	19.0	

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	0	X	0	0	0	0	0	9	0.00	
4	2	4	2	4	2	X	3	3	2	2	24	9	2.67	
5	5	9	0	8	9	X	7	5	9	5	57	9	6.33	
6	0	0	0	0	0	X	0	0	0	0	0	9	0.00	
7	10	13	7	14	15	X	3	15	18	7	102	9	11.3	
8														
TOTAL	17	26	9	26	26	0	13	23	29	14	183	10	18.3	

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	0.87500	1.20940
2	32 %	1	1.00000	1.39310
2	32 %	2	1.00000	1.39310
2	32 %	3	1.00000	1.39310
2	32 %	4	1.00000	1.39310
2	32 %	5	1.00000	1.39310
3	42 %	1	1.00000	1.39310
3	42 %	2	1.00000	1.39310
3	42 %	3	0.75000	1.04720
3	42 %	4	1.00000	1.39310
3	42 %	5	1.00000	1.39310
4	56 %	1	1.00000	1.39310
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	1.00000	1.39310
5	75 %	2	1.00000	1.39310
5	75 %	3	0.87500	1.20940
5	75 %	4	1.00000	1.39310
5	75 %	5	1.00000	1.39310
6	100 %	1	0.87500	1.20940
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 = 0.1767 W = 0.6823 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 %	30.00	16.00	5.00	
3	42 %	27.00	16.00	5.00	
4	56 %	30.00	16.00	5.00	
5	75 %	27.50	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 = 0.02228 W = 0.9577 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 = 1.066 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	0.03096	0.006192	6.667
Within (Error)	24	0.02229	0.0009288	
Total	29	0.05325		
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	0.2994	0.2994		
2	32 %	0.2886	0.2886	0.5603	
3	42 %	0.2916	0.2916	0.4047	
4	56 %	0.2914	0.2914	0.415	
5	75 %	0.364	0.364	-3.352	
6	100 %	0.3568	0.3568	-2.978	
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	0.04549	15.2	0.0108
3	42 %	5	0.04549	15.2	0.0078
4	56 %	5	0.04549	15.2	0.008
5	75 %	5	0.04549	15.2	-0.0646
6	100 %	5	0.04549	15.2	-0.0574



Appendix A2: Statistics

*Ceriodaphnia dubia* Survival

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

Critical Fisher's value (10,10,10) (alpha=0.05) is 6. b value is 9. Since b is greater than 6 there is NO SIGNIFICANT DIFFERENCE between CONTROL and TREATMENT at the 0.05 level.

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

Critical Fisher's value (10,10,10) (alpha=0.05) is 6. b value is 10. Since b is greater than 6 there is NO SIGNIFICANT DIFFERENCE between CONTROL and TREATMENT at the 0.05 level.

Fisher's Exact Test			
Identification	Alive	Dead	Total Animals
Control	10	0	10
56 %	10	0	10
Total	20	0	20

Critical Fisher's value (10,10,10) (alpha=0.05) is 6. b value is 10. Since b is greater than 6 there is NO SIGNIFICANT DIFFERENCE between CONTROL and TREATMENT at the 0.05 level.

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

Critical Fisher's value (10,10,10) (alpha=0.05) is 6. b value is 9. Since b is greater than 6 there is NO SIGNIFICANT DIFFERENCE between CONTROL and TREATMENT at the 0.05 level.

Appendix A2: Statistics

*Ceriodaphnia dubia* Survival

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

Critical Fisher's value (10,10,10) (alpha=0.05) is 6. b value is 9. Since b is greater than 6 there is NO SIGNIFICANT DIFFERENCE between CONTROL and TREATMENT at the 0.05 level.

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

Appendix A2: Statistics

*Ceriodaphnia dubia* Reproduction

Kolmogorov Test for Normality	No Transformation
<p>D = 0.0924 D* = 0.7249 Critical D* = 1.035 (alpha = 0.01, N = 60)</p> <p>Data PASS normality test (alpha = 0.01).</p>	

Bartlett's Test for Homogeneity of Variance	No Transformation
<p>Calculated B1 statistic = 12.74 Critical B = 15.086 (alpha = 0.01, df = 5)</p> <p>Data PASS B1 homogeneity test at 0.01 level.</p>	

Appendix A2: Statistics

*Ceriodaphnia dubia* Reproduction

ANOVA Table				No Transformation	
SOURCE	DF	SS	MS	F	
Between	5	347	69.4	1.604	
Within (Error)	54	2336	43.26		
Total	59	2683			
Critical F = 3.38 (alpha = 0.01, df = 5,54)					
2.38 (alpha = 0.05, df = 5,54)					
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	24.4	24.4			
2	32 %	17.7	17.7	2.278		
3	42 %	21.9	21.9	0.8499		
4	56 %	18.4	18.4	2.04		
5	75 %	19	19	1.836		
6	100 %	18.3	18.3	2.074		
Dunnett's critical value = 2.31 (1 Tailed, alpha = 0.05, df [used] = 5,40) (Actual df = 5,54)						

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	10					
2	32 %	10	6.795	27.8	6.7		
3	42 %	10	6.795	27.8	2.5		
4	56 %	10	6.795	27.8	6		
5	75 %	10	6.795	27.8	5.4		
6	100 %	10	6.795	27.8	6.1		

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	229.1	45.82	1.416	
Within (Error)	51	1650	32.35		
Total	56	1879			

Critical F = 3.4 (alpha = 0.01, df = 5,51)  
2.4 (alpha = 0.05, df = 5,51)

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	24.4	24.4			
2	32 %	19.444	19.444	1.896		
3	42 %	21.9	21.9	0.9829		
4	56 %	18.4	18.4	2.359	*	
5	75 %	19.667	19.667	1.811		
6	100 %	20.333	20.333	1.556		

Dunnett's critical value = 2.31 (1 Tailed, alpha = 0.05, df [used] = 5,40) (Actual df = 5,51)  
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	10				
2	32 %	9	6.037	24.7	4.956	
3	42 %	10	5.876	24.1	2.5	
4	56 %	10	5.876	24.1	6	
5	75 %	9	6.037	24.7	4.733	
6	100 %	9	6.037	24.7	4.067	

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: June 2, 2015 at 1049

Date and Time Test Terminated: June 9, 2015 at 1145

Effluent Conc.: Control	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
DO, mg/l	Initial	7.3	7.6	7.6	7.6	7.6	7.7	7.7
	Final *1	7.0	7.0	7.2	7.3	7.3	7.1	6.8
	Final *2	7.7	7.6	7.8	7.7	7.7	8.4	8.0
pH, units	Initial	7.7	7.6	7.9	7.8	7.8	7.8	7.9
	Final *1	7.5	7.8	7.7	7.6	7.8	7.7	7.6
	Final *2	7.9	8.1	8.0	8.0	8.0	8.2	8.1
Alkalinity, mg CaCO <sub>3</sub> /l	60	NA	60	NA	61	NA	NA	
Hardness, mg CaCO <sub>3</sub> /l	80	NA	80	NA	82	NA	NA	
Conductivity, umhos/cm	280	280	280	280	270	280	280	
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	7.2	7.3	7.2	7.2	7.5	7.1	7.6
	Final *1	6.9	6.3	6.7	7.4	7.2	7.2	6.8
	Final *2	7.4	7.2	7.4	7.0	7.8	7.9	7.6
pH, units	Initial	7.6	7.6	7.9	7.7	7.6	7.9	7.8
	Final *1	7.6	7.6	7.6	7.7	7.9	7.8	7.8
	Final *2	8.0	8.1	8.0	7.9	8.1	8.1	8.1

Effluent Conc.: 42 %	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
DO, mg/l	Initial	7.3	7.1	7.1	7.1	7.7	7.2	7.3
	Final *1	7.2	6.4	6.9	7.2	7.7	7.2	6.8
	Final *2	7.5	7.2	7.5	7.0	7.9	8.0	7.6
pH, units	Initial	7.6	7.6	7.9	7.6	7.6	8.0	7.7
	Final *1	7.8	7.8	7.6	7.7	7.9	7.8	7.8
	Final *2	8.0	8.1	8.0	8.0	8.1	8.2	8.2

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: June 2, 2015 at 1049

Date and Time Test Terminated: June 9, 2015 at 1145

Effluent Conc.: 56 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.2	7.4	7.5	7.2	7.4	7.5	7.4
	Final *1	6.7	6.0	6.9	6.8	7.8	7.0	6.7
	Final *2	7.3	7.2	7.2	7.3	8.0	8.0	7.7
pH, units	Initial	7.6	7.6	7.9	7.6	7.6	8.0	7.7
	Final *1	7.8	7.7	7.6	7.8	8.0	7.9	7.8
	Final *2	8.0	8.1	8.1	8.0	8.2	8.2	8.2

Effluent Conc.: 75 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	6.8	7.5	7.4	7.2	7.2	7.6	7.3
	Final *1	6.7	6.3	6.9	7.1	7.6	6.9	6.8
	Final *2	7.3	7.6	7.6	7.5	7.4	8.1	7.8
pH, units	Initial	7.5	7.6	7.8	7.6	7.5	8.1	7.7
	Final *1	7.8	7.8	7.8	7.8	8.0	8.0	7.9
	Final *2	8.0	7.8	8.1	8.0	8.2	8.3	8.3

Effluent Conc.: 100 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.0	7.0	7.1	7.1	7.5	6.9	6.5
	Final *1	7.0	5.7	6.7	7.2	7.4	7.0	6.7
	Final *2	6.7	7.2	7.2	6.8	7.9	7.9	7.7
pH, units	Initial	7.5	7.4	7.7	7.7	7.5	8.1	7.5
	Final *1	7.9	7.7	7.7	7.9	8.1	8.0	8.0
	Final *2	8.0	8.3	8.2	8.2	8.3	8.4	8.4
Alkalinity, mg CaCO <sub>3</sub> /l		100	NA	110	NA	140	NA	NA
Hardness, mg CaCO <sub>3</sub> /l		160	NA	160	NA	150	NA	NA
Conductivity, umhos/cm		600	600	600	650	800	800	810
Res. Chlorine, mg/l		<0.05	NA	<0.05	NA	<0.05	NA	NA

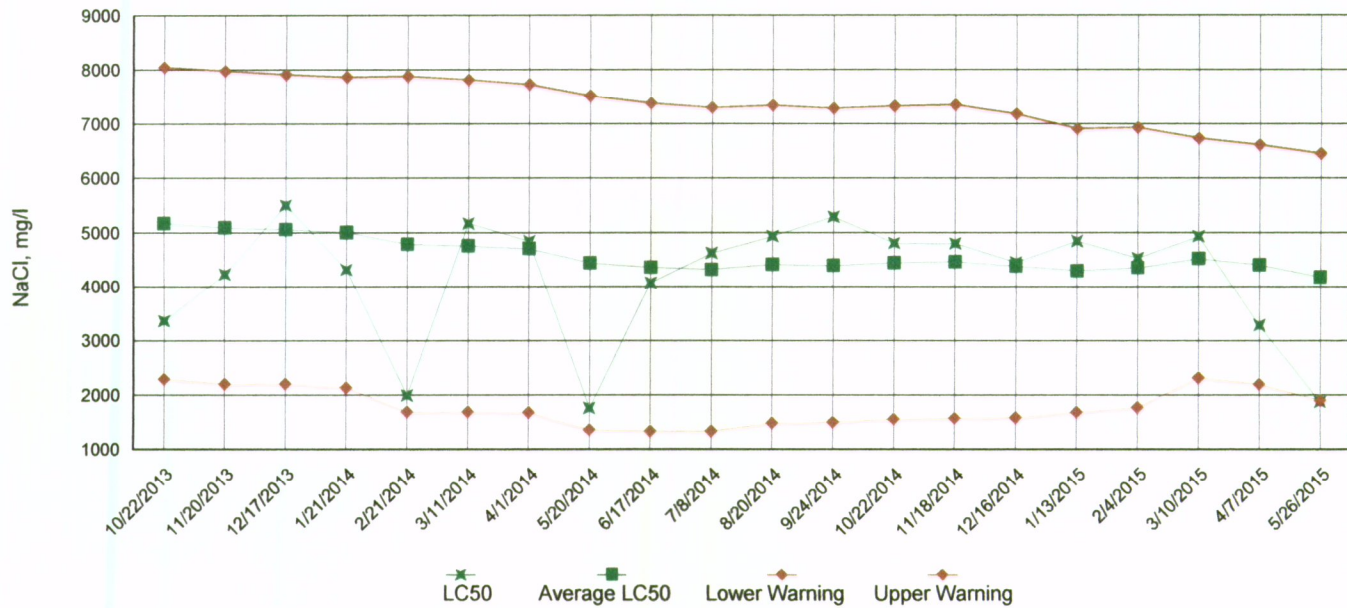
\*1 = data from the *Pimephales promelas* (Fathead Minnow) test

\*2 = data from the *Ceriodaphnia dubia* test

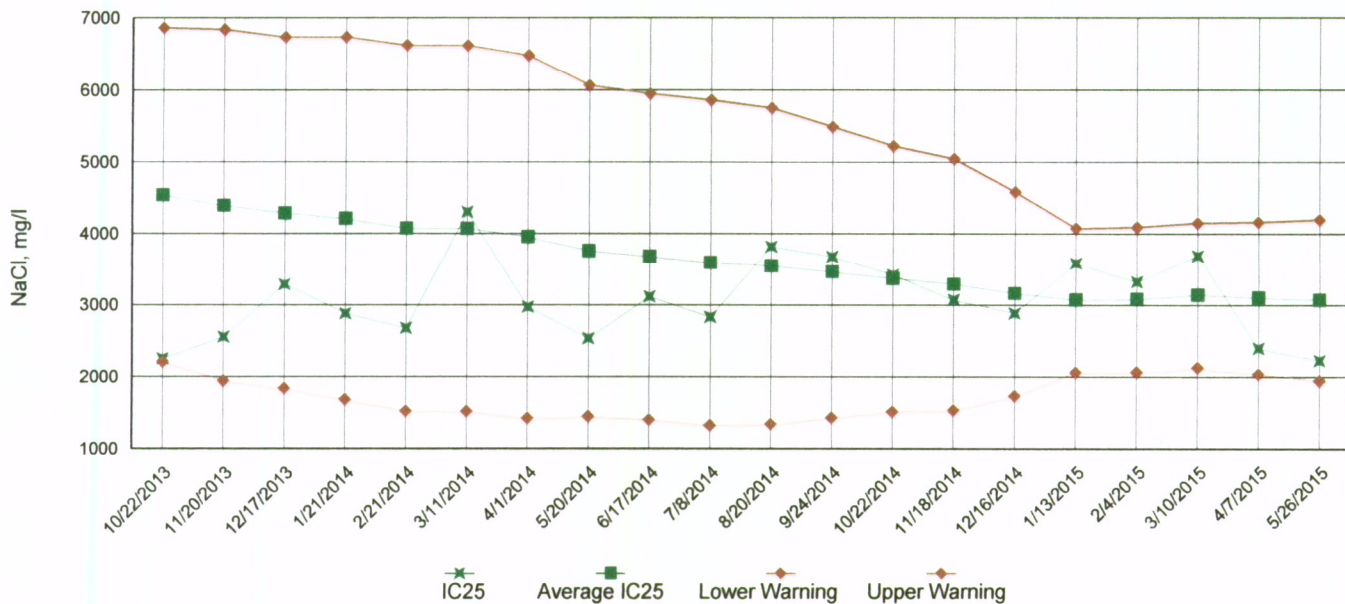
Appendix A4: Test 1000.0

Chronic Reference Toxicant, *Pimephales promelas* (Fathead Minnow)

LC50 Survival Data



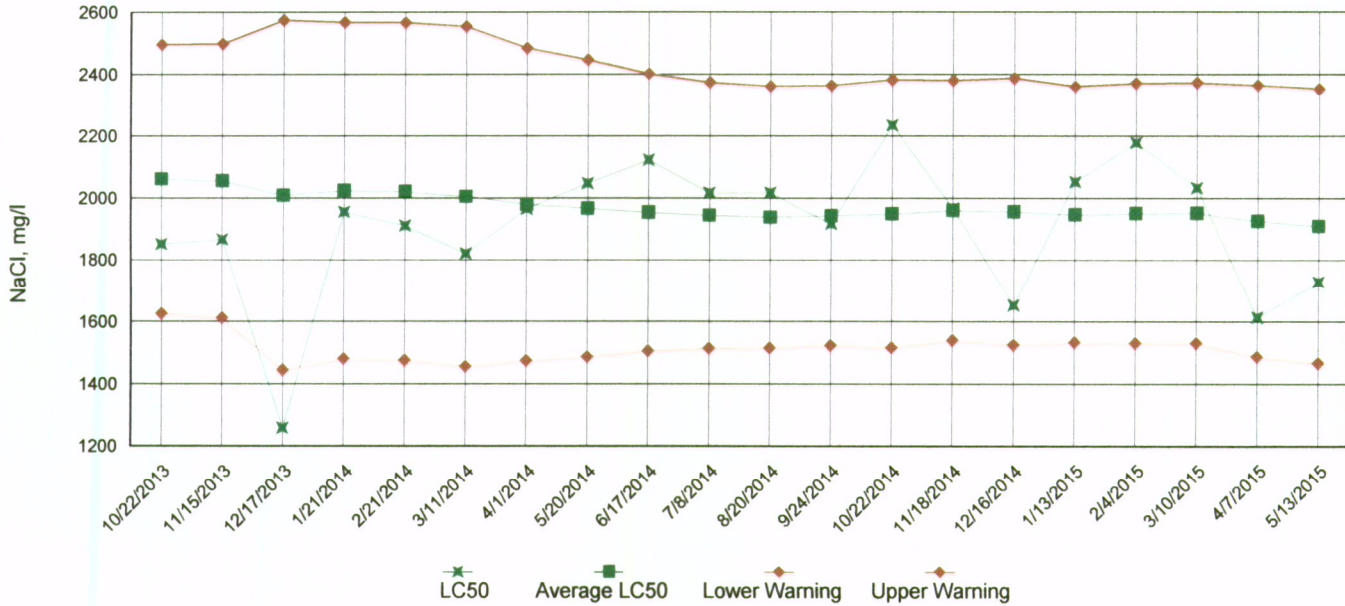
IC25 Growth Data



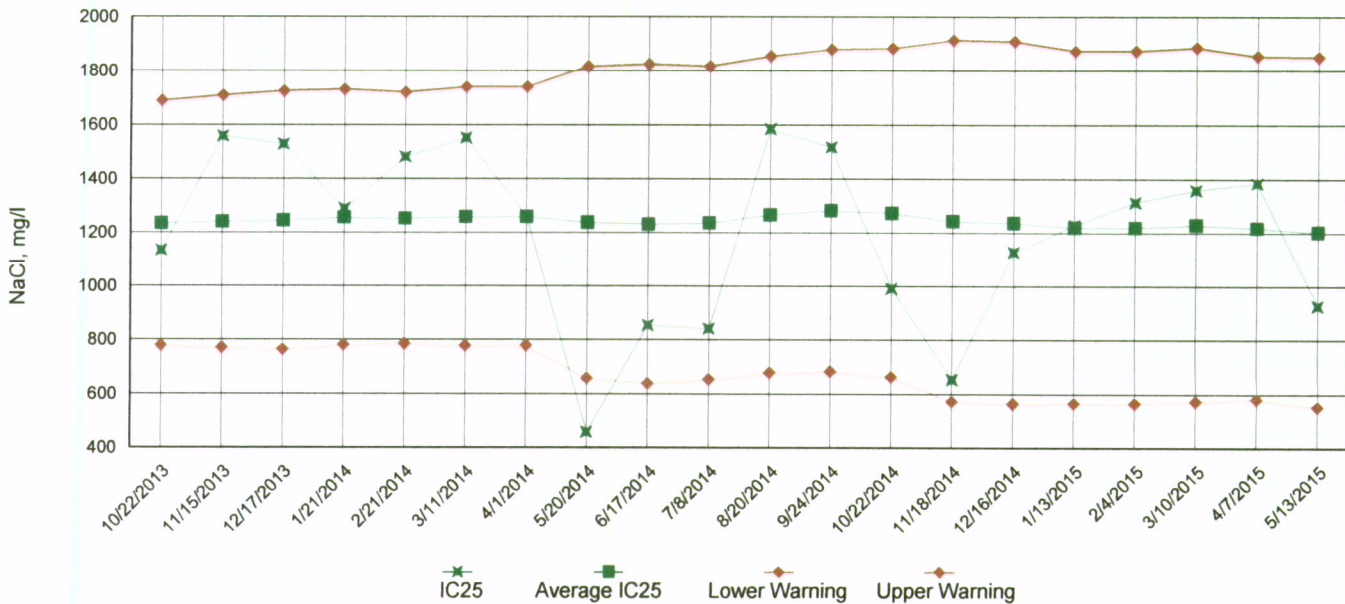


Appendix A4: Test 1002.0  
Chronic Reference Toxicant, *Ceriodaphnia dubia*

LC50 Survival Data



IC25 Reproduction Data



Appendix B: Test 1000.0  
SUMMARY REPORTING FORMS  
CHRONIC BIOMONITORING  
*Pimephales promelas* (Fathead Minnow)  
SURVIVAL AND GROWTH

Permittee: Huntsville Water Utilities

NPDES No.: AR0022004 AFIN# 44-00018

Date and Time Test Initiated: June 2, 2015 at 1135

Date and Time Test Terminated: June 9, 2015 at 1020

Dilution water used: Synthetic Moderately Hard Water #4218

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	87.5	97.5	97.5	97.5	5.73
32 %	100	100	100	100	100	100	100	100	0.00
42 %	100	100	75.0	100	100	100	100	95.0	11.8
56 %	100	100	100	100	100	100	100	100	0.00
75 %	100	100	87.5	100	100	100	100	97.5	5.73
100 %	87.5	100	100	100	100	97.5	97.5	97.5	5.73

DATA TABLE FOR GROWTH

Effluent Conc. %	Average dry weight, mg replicate chambers					Mean dry weight, mg	CV%
	A	B	C	D	E		
Control	0.328	0.301	0.299	0.321	0.248	0.299	10.5
32 %	0.255	0.298	0.285	0.315	0.290	0.289	7.61
42 %	0.341	0.299	0.270	0.258	0.290	0.292	11.0
56 %	0.258	0.272	0.288	0.345	0.294	0.291	11.4
75 %	0.342	0.372	0.335	0.370	0.401	0.364	7.26
100 %	0.338	0.331	0.328	0.376	0.411	0.357	10.1

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	_____ X 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	_____ X 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:   10.5   (TQP6C)

## Appendix B: Test 1000.0

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

PERMITTEE: <u>Huntsville Water Utilities</u>	SAMPLE No. 1 COLLECTED ending: <u>DATE: June 1, 2015</u>	TIME: <u>0500</u>
NPDES NO.: <u>AR0022004 AFIN# 44-00018</u>	SAMPLE No. 2 COLLECTED ending: <u>DATE: June 3, 2015</u>	TIME: <u>0500</u>
CONTACT: <u>Mr. Bill Eoff</u>	SAMPLE No. 3 COLLECTED ending: <u>DATE: June 5, 2015</u>	TIME: <u>0500</u>
ANALYST: <u>280, 304, 310, 314</u>	Test Initiated: <u>DATE: June 2, 2015</u>	TIME: <u>1135</u>
	Test Terminated: <u>DATE: June 9, 2015</u>	TIME: <u>1020</u>

DILUTION	DAY						
	1	2	3	4	5	6	7
Control							
D.O. Initial	7.3	7.6	7.6	7.6	7.6	7.7	7.7
Final	7.0	7.0	7.2	7.3	7.3	7.1	6.8
pH Initial	7.7	7.6	7.9	7.8	7.8	7.8	7.9
Final	7.5	7.8	7.7	7.6	7.8	7.7	7.6
Alkalinity	60	NA	60	NA	61	NA	NA
Hardness	80	NA	80	NA	82	NA	NA
Conductivity	280	280	280	280	270	280	280
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
32 %							
D.O. Initial	7.2	7.3	7.2	7.2	7.5	7.1	7.6
Final	6.9	6.3	6.7	7.4	7.2	7.2	6.8
pH Initial	7.6	7.6	7.9	7.7	7.6	7.9	7.8
Final	7.6	7.6	7.6	7.7	7.9	7.8	7.8
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	380	380	380	390	440	440	440
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
42 %							
D.O. Initial	7.3	7.1	7.1	7.1	7.7	7.2	7.3
Final	7.2	6.4	6.9	7.2	7.7	7.2	6.8
pH Initial	7.6	7.6	7.9	7.6	7.6	8.0	7.7
Final	7.8	7.8	7.6	7.7	7.9	7.8	7.8
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	410	410	410	420	490	490	490
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
56 %							
D.O. Initial	7.2	7.4	7.5	7.2	7.4	7.5	7.4
Final	6.7	6.0	6.9	6.8	7.8	7.0	6.7
pH Initial	7.6	7.6	7.9	7.6	7.6	8.0	7.7
Final	7.8	7.7	7.6	7.8	8.0	7.9	7.8
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	460	460	480	480	560	560	570
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
75 %							
D.O. Initial	6.8	7.5	7.4	7.2	7.2	7.6	7.3
Final	6.7	6.3	6.9	7.1	7.6	6.9	6.8
pH Initial	7.5	7.6	7.8	7.6	7.5	8.1	7.7
Final	7.8	7.8	7.8	7.8	8.0	8.0	7.9
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	530	520	520	540	660	660	670
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
100 %							
D.O. Initial	7.0	7.0	7.1	7.1	7.5	6.9	6.5
Final	7.0	5.7	6.7	7.2	7.4	7.0	6.7
pH Initial	7.5	7.4	7.7	7.7	7.5	8.1	7.5
Final	7.9	7.7	7.7	7.9	8.1	8.0	8.0
Alkalinity	100	NA	110	NA	140	NA	NA
Hardness	160	NA	160	NA	150	NA	NA
Conductivity	600	600	600	650	800	800	810
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: Huntsville Water Utilities

NPDES No.: AR0022004 AFIN# 44-00018

Date and Time Test Initiated: June 2, 2015 at 1135

Date and Time Test Terminated: June 9, 2015 at 1145

Dilution water used: Synthetic Moderately Hard Water #4218

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
7 day	100	90.0	100	100	90.0	90.0

NUMBER OF YOUNG PRODUCED PER FEMALE @ 7 DAYS

Replicates	Control	Percent Effluent				
		32 %	42 %	56 %	75 %	100 %
A	23	21	27	22	13	17
B	25	22	17	16	22	26
C	23	13	18	7	7	9
D	27	18	22	18	21	26
E	22	22	29	20	22	26
F	22	2	18	23	3	0
G	24	19	27	17	30	13
H	31	13	23	18	23	23
I	19	25	20	22	26	29
J	28	22	18	21	23	14
Mean per Adult	24.4	17.7	21.9	18.4	19.0	18.3
Mean per Surviving Adult	24.4	19.4	21.9	18.4	19.7	20.3
CV %	14.2	21.4	20.2	25.3	44.8	35.3

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 %)	_____ YES	_____ X NO
b.) 1/2 LOW FLOW DILUTION	(NA)	_____ YES	_____ NO

2. Dunnett's 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 %)	_____ YES	_____ X NO
b.) 1/2 LOW FLOW DILUTION	(NA)	_____ YES	_____ 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:   35.3   (TQP3B)

Appendix B: Test 1002.0

CHRONIC TOXICITY SUMMARY FORM  
*Ceriodaphnia dubia*  
CHEMICAL PARAMETERS CHART

PERMITTEE: <u>Huntsville Water Utilities</u>	SAMPLE No. 1 COLLECTED ending: <u>DATE: June 1, 2015</u>	TIME: <u>0500</u>
NPDES NO.: <u>AR0022004 AFIN# 44-00018</u>	SAMPLE No. 2 COLLECTED ending: <u>DATE: June 3, 2015</u>	TIME: <u>0500</u>
CONTACT: <u>Mr. Bill Eoff</u>	SAMPLE No. 3 COLLECTED ending: <u>DATE: June 5, 2015</u>	TIME: <u>0500</u>
ANALYST: <u>280, 304, 310, 314</u>	Test Initiated: <u>DATE: June 2, 2015</u>	TIME: <u>1135</u>
	Test Terminated: <u>DATE: June 9, 2015</u>	TIME: <u>1145</u>

DILUTION	DAY						
	1	2	3	4	5	6	7
Control							
D.O. Initial	7.3	7.6	7.6	7.6	7.6	7.7	7.7
Final	7.7	7.6	7.8	7.7	7.7	8.4	8.0
pH Initial	7.7	7.6	7.9	7.8	7.8	7.8	7.9
Final	7.9	8.1	8.0	8.0	8.0	8.2	8.1
Alkalinity	60	NA	60	NA	61	NA	NA
Hardness	80	NA	80	NA	82	NA	NA
Conductivity	280	280	280	280	270	280	280
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
32 %							
D.O. Initial	7.2	7.3	7.2	7.2	7.5	7.1	7.6
Final	7.4	7.2	7.4	7.0	7.8	7.9	7.6
pH Initial	7.6	7.6	7.9	7.7	7.6	7.9	7.8
Final	8.0	8.1	8.0	7.9	8.1	8.1	8.1
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	380	380	380	390	440	440	440
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
42 %							
D.O. Initial	7.3	7.1	7.1	7.1	7.7	7.2	7.3
Final	7.5	7.2	7.5	7.0	7.9	8.0	7.6
pH Initial	7.6	7.6	7.9	7.6	7.6	8.0	7.7
Final	8.0	8.1	8.0	8.0	8.1	8.2	8.2
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	410	410	410	420	490	490	490
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
56 %							
D.O. Initial	7.2	7.4	7.5	7.2	7.4	7.5	7.4
Final	7.3	7.2	7.2	7.3	8.0	8.0	7.7
pH Initial	7.6	7.6	7.9	7.6	7.6	8.0	7.7
Final	8.0	8.1	8.1	8.0	8.2	8.2	8.2
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	460	460	480	480	560	560	570
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
75 %							
D.O. Initial	6.8	7.5	7.4	7.2	7.2	7.6	7.3
Final	7.3	7.6	7.6	7.5	7.4	8.1	7.8
pH Initial	7.5	7.6	7.8	7.6	7.5	8.1	7.7
Final	8.0	7.8	8.1	8.0	8.2	8.3	8.3
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	530	520	520	540	660	660	670
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
100 %							
D.O. Initial	7.0	7.0	7.1	7.1	7.5	6.9	6.5
Final	6.7	7.2	7.2	6.8	7.9	7.9	7.7
pH Initial	7.5	7.4	7.7	7.7	7.5	8.1	7.5
Final	8.0	8.3	8.2	8.2	8.3	8.4	8.4
Alkalinity	100	NA	110	NA	140	NA	NA
Hardness	160	NA	160	NA	150	NA	NA
Conductivity	600	600	600	650	800	800	810
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA



8600 Kanis Road  
 Little Rock, AR 72204-2322  
 (501) 224-5060  
 FAX (501) 224-5072

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: Huntsville Water Utilities		PO No.	ANALYSES REQUESTED												AIC CONTROL NO: 191022					
Project Reference: Bio Monitoring		SAMPLE MATRIX													AIC PROPOSAL NO:					
Project Manager: Bill Eoff			WATER													Carrier:				
Sampled By: Bill Eoff		G	C	A	S	NO OF BOTTLES	Cd & Pb Chronic													Received on ice (4°C)? <b>YES</b> 2-1 NO
AIC No.	Sample Identification	R	O	T	O															Remarks
	Huntsville#1	B	M	E	I	3	X													

Field pH calibration on \_\_\_\_\_ @ \_\_\_\_\_ Buffer:

G = Glass P = Plastic V = VOA vials H = HCl to pH2 T = Sodium Thiosulfate  
 NO = none S = Sulfuric acid pH2 N = Nitric acid pH2 B = NaOH to pH12 Z = Zinc acetate

Turnaround Time Requested: (Please circle) NORMAL or EXPEDITED IN \_\_\_\_\_ DAYS  
 Expedited results requested by: \_\_\_\_\_  
 Who should AIC contact with questions: Bill Eoff  
 Phone: (479) - 738 - 208 Fax: (479) - 738 - 1285  
 Report Attention to: Bill Eoff  
 Report Address to: Bill Eoff  
Huntsville Water Utilities  
P.O. Box 430

Relinquished By: <u>BM</u>	Date/Time: <u>6/1/15 @ 8:00</u>	Received By:	Date/Time:
Relinquished By:	Date/Time:	Received in Lab By:	Date/Time: <u>02JUN15 0830</u>

Comments: \_\_\_\_\_  
 FEDEX # 80940810065





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CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

PAGE 2 OF 3

Client: <u>Huntsville Water Utilities</u>			PO No.		NO OF BOTTLES	Cd & Pb Chronic	ANALYSES REQUESTED										AIC CONTROL NO: <u>191022</u>			
Project Reference: <u>Bio Monitoring</u>			SAMPLE MATRIX														AIC PROPOSAL NO:			
Project Manager: <u>Bill Eoff</u>			G R A B	C O M P	W A T E R	S O I L	B O T T L E S	Cd & Pb Chronic											Carrier: <u>FedEx</u>	
Sampled By: <u>Bill Eoff</u>																			Received on Ice (4°C)? <u>YES</u> NO	
AIC No.	Sample Identification	Date/Time Collected															Remarks <u>Δ.12</u>			
<u>2</u>	<u>Huntsville#2</u>	<u>6/2/15 @ 7:00- 6/3/15 @ 5:00</u>		<u>X</u>	<u>X</u>		<u>3</u>	<u>X</u>												
Container Type <u>P</u>			Field pH calibration on _____ @ _____																	
Preservative <u>4C</u>			Buffer:																	
G = Glass P = Plastic V = VOA vials			H = HCl to pH2 T = Sodium Thiosulfate																	
NO = none S = Sulfuric acid pH2 N = Nitric acid pH2			B = NaOH to pH12 Z = Zinc acetate																	
Turnaround Time Requested: (Please circle) <u>NORMAL</u> or EXPEDITED IN _____ DAYS					Relinquished By: <u>BM</u>		Date/Time: <u>6/3/15 @ 8:00</u>		Received By:		Date/Time:									
Expedited results requested by: _____					Relinquished By:		Date/Time:		Received in Lab By: <u>D. BROWN</u>		Date/Time: <u>6-4-15 0845</u>									
Who should AIC contact with questions: <u>Bill Eoff</u>					Comments: <u>FED EX: 8019 4081 0054</u>															
Phone: <u>(479) - 738 - 208</u> Fax: <u>(479) - 738 - 1285</u>																				
Report Attention to: <u>Bill Eoff</u>																				
Report Address to: <u>Bill Eoff Huntsville Water Utilities P.O. Box 430</u>																				



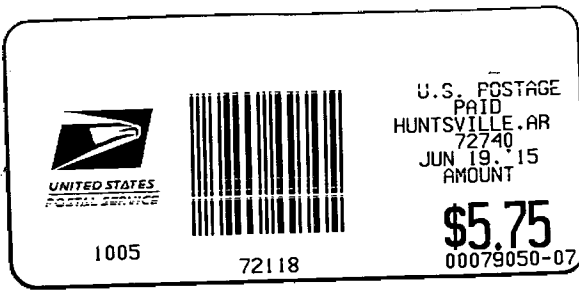
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CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

PAGE 3 OF 3

Client: Huntsville Water Utilities			PO No.		NO OF BOTTLES	Cd & Pb Chronic	ANALYSES REQUESTED												AIC CONTROL NO: 191022		
Project Reference: Bio Monitoring			SAMPLE MATRIX																AIC PROPOSAL NO:		
Project Manager: Bill Eoff			G R A B	C O M P	W A T E R	S O I L	3	X													Carrier: FedEx
Sampled By: Bill Eoff																					Received on Ice (4°C)? (YES) 10°C NO
AIC No.	Sample Identification	Date/Time Collected																	Remarks		
3	Huntsville #3	6/4/15 @ 7:00 6/5/15 @ 5:00		X	X																
		Container Type	p																	Field pH calibration	
		Preservative	4C																	on _____ @ _____	
		G = Glass    P = Plastic    V = VOA vials    H = HCl to pH2    T = Sodium Thiosulfate NO = none    S = Sulfuric acid pH2    N = Nitric acid pH2    B = NaOH to pH12    Z = Zinc acetate																Buffer:			
Turnaround Time Requested: (Please circle) NORMAL or EXPEDITED IN _____ DAYS				Relinquished By: <i>Bm</i>		Date/Time: 6/5/15 @ 8:00		Received By:		Date/Time:											
Expedited results requested by: _____				Relinquished By:		Date/Time:		Received in Lab By: <i>Shawn Worn</i>		Date/Time: 6-6-15 (0810)											
Who should AIC contact with questions: Bill Eoff																				Comments: FedEx: 8019 4081 0076	
Phone: (479) - 738 - 208 Fax: (479) - 738 - 1285																					
Report Attention to: Bill Eoff																					
Report Address to: Bill Eoff Huntsville Water Utilities P.O. Box 430																					

Huntsville Water Utilities  
P.O. Box 430  
Huntsville, AR 72740



A.D.E.Q.  
Water Enforcement Division  
5301 Northshore Drive  
North Little Rock, AR 72118-5317

