

November 1, 2013

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

Control No. 171765-1

Prepared for:

Mr. Bill Eoff
Huntsville Water Utilities
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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

The signature of John Overbey is written in black ink above a horizontal line. Below the line, his name and title are printed in a standard font.

PDF cc: Huntsville Water Utilities
ATTN: Mr. Bill Eoff
billeoff@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%	100	PASS
Control Growth > or = 0.25 mg per Surviving minnow	0.346	PASS
Control Growth CV < or = 40%	25.5	PASS
Growth Minimum Significant Difference 12 to 30%	21.2	PASS
Critical Dilution CV < or = 40%	26.1	PASS

Ceriodaphnia dubia Method 1002.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	100	PASS
Control Reproduction > or = 15 per Surviving Female	20.7	PASS
Control CV < or = 40% per Surviving Female	19.3	PASS
Reproduction Minimum Significant Difference 13 to 47%	23.7	PASS
Critical Dilution CV < or = 40%	26.3	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)	8.2	8.0	9.0
pH (standard units)	7.8	7.9	8.0
Alkalinity (mg/l as CaCO ₃)	130	120	100
Hardness (mg/l as CaCO ₃)	210	220	240
Conductivity (umhos/cm)	1000	1000	980
Residual Chlorine (mg/l)	<0.05	<0.05	<0.05
Ammonia as N (mg/l)	0.16	0.20	1.4

2. Dilution Water Samples: Synthetic Moderately Hard Water #4030

- a. Dates Prepared: October 16 through October 30, 2013
- b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	8.0	8.2	8.7
pH (standard units)	7.9	7.9	7.9
Alkalinity (mg/l as CaCO ₃)	63	63	63
Hardness (mg/l as CaCO ₃)	84	86	86
Conductivity (umhos/cm)	330	310	310
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: October 22, 2013 at 1120
Date & Time Test Terminated: October 29, 2013 at 1243
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: October 22, 2013 at 1305
Date & Time Test Terminated: October 30, 2013 at 1320
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. Steel's Many-One Rank test was used to determine the No Observable Effects Concentration (NOEC) for growth. Dunnett's Test was used to calculate the PMSD.

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

The results were as follows: (Control No. 171976-1.)

Survival LC-50: mg/l

Growth IC-25: mg/l

Growth PMSD:

Ceriodaphnia dubia

Chronic reference tests are performed monthly.

A chronic reference test was performed on

The results were as follows: (Control No. 171976-2.)

Survival LC-50: mg/l

Growth IC-25: mg/l

Growth PMSD:

V. Chemical Analysis/Quality Control

Parameter	Method	% Recovery	Relative % Difference
Alkalinity	SM 2320 B	NA	0.00
Hardness	EPA 200.7	97.1	3.00
pH	SM 4500-H+ B	101	0.538
Conductivity	EPA 120.1	105	0.647

VI. Organism History

Pimephales promelas (Fathead minnow)

Date: October 22, 2013

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: October 22, 2013

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

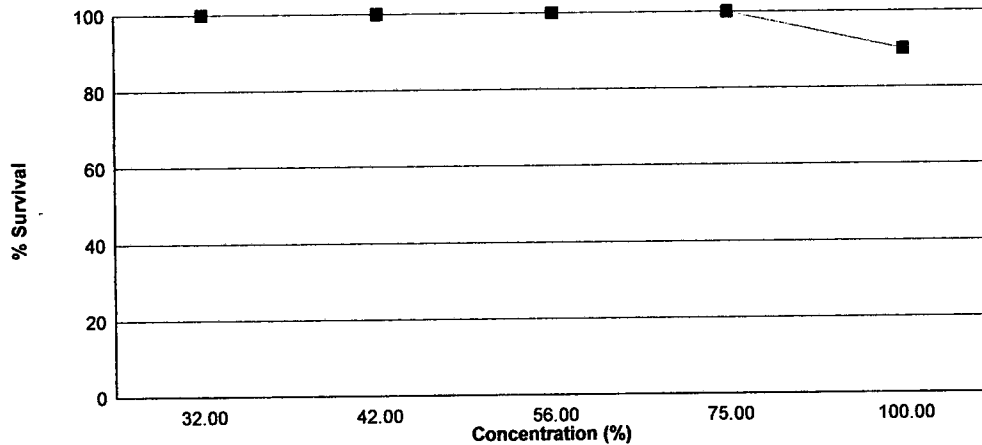
Larvae are exposed in a static renewal system for seven days to different concentrations of effluent with dilution water. Test results are based on the survival and growth (increase in weight) of the larvae.

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 October 22, 2013 at 1120 and continued through October 29, 2013 at 1243. 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	0.346
32 %	100	0.337
42 %	100	0.343
56 %	100	0.253
75 %	100	0.300
100 %	90.0	0.203

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

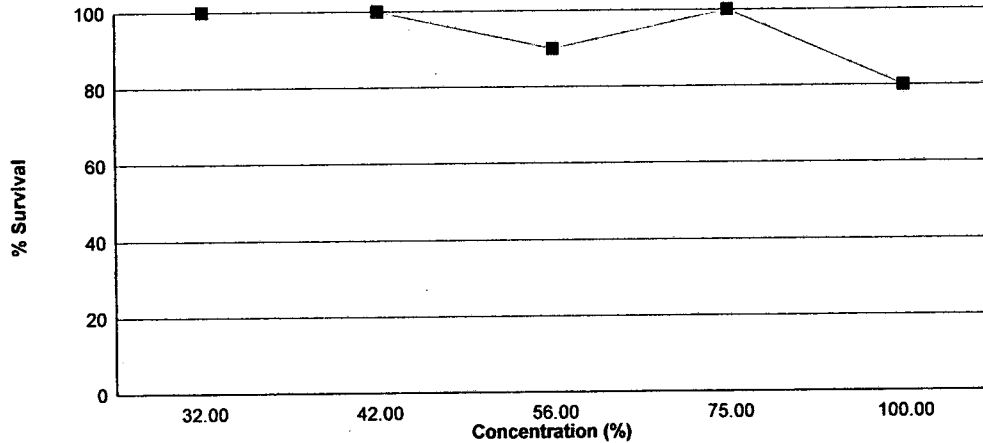
Neonates are exposed in a static renewal system to different concentrations of effluent with dilution water until 60% of surviving control organisms have three broods of offspring with an average of at least 15 young per female.

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 October 22, 2013 at 1305 and continued through October 30, 2013 at 1320. 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	100	20.7
32 %	100	25.3
42 %	100	25.5
56 %	90.0	22.1
75 %	100	23.8
100 %	80.0	18.3

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Survival

Date and Time Test Initiated: October 22, 2013 at 1120

Date and Time Test Terminated: October 29, 2013 at 1243

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	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	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	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	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	6	6
	C	8	8	8	8	6	6	6
	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: October 22, 2013 at 1120
Test Terminated: October 29, 2013 at 1243

Drying Started: October 25, 2013 at 1537
Drying Ended: October 30, 2013 at 1345

Concentration	Replicate	Weight of pan	Weight of pan + fish	Total weight of fish (g)	Original # of fish	Mean dry weight (mg)
Control	A	.93376	.93608	0.00232	8	0.290
	B	.93353	.93638	0.00285	8	0.356
	C	.93380	.93659	0.00279	8	0.349
	D	.93427	.93814	0.00387	8	0.484
	E	.93511	.93713	0.00202	8	0.252
32 %	A	.93614	.93862	0.00248	8	0.310
	B	.93541	.93803	0.00262	8	0.328
	C	.93457	.93729	0.00272	8	0.340
	D	.93339	.93604	0.00265	8	0.331
	E	.93107	.93406	0.00299	8	0.374
42 %	A	.92998	.93236	0.00238	8	0.298
	B	.93056	.93343	0.00287	8	0.359
	C	.93354	.93627	0.00273	8	0.341
	D	.93320	.93603	0.00283	8	0.354
	E	.93311	.93603	0.00292	8	0.365
56 %	A	.93558	.93716	0.00158	8	0.198
	B	.93570	.93731	0.00161	8	0.201
	C	.93713	.93939	0.00226	8	0.282
	D	.93968	.94191	0.00223	8	0.279
	E	.93876	.94120	0.00244	8	0.305
75 %	A	.93683	.93912	0.00229	8	0.286
	B	.94176	.94425	0.00249	8	0.311
	C	.94254	.94493	0.00239	8	0.299
	D	.93421	.93663	0.00242	8	0.302
	E	.93213	.93456	0.00243	8	0.304
100 %	A	.93100	.93241	0.00141	8	0.176
	B	.92937	.93058	0.00121	8	0.151
	C	.92776	.92911	0.00135	8	0.169
	D	.92803	.93017	0.00214	8	0.268
	E	.92840	.93042	0.00202	8	0.252

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: October 22, 2013 at 1305

Date and Time Test Terminated: October 30, 2013 at 1320

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	0	3	2	4	0	0	0	0	4	3	16	10	1.60	
5	3	1	0	0	4	3	0	0	0	0	11	10	1.10	
6	8	8	8	8	8	8	3	6	9	8	74	10	7.40	
7	0	9	0	0	0	0	10	0	0	0	19	10	1.90	
8	9	1	11	12	11	12	0	8	11	12	87	10	8.70	
TOTAL	20	22	21	24	23	23	13	14	24	23	207	10	20.7	

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	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	0	5	0	2	1	0	3	1	18	10	1.80	
5	0	0	0	0	5	0	0	0	0	0	5	10	0.500	
6	8	10	6	8	12	12	11	0	12	8	87	10	8.70	
7	0	0	13	9	0	0	0	10	0	11	43	10	4.30	
8	16	14	0	5E	8	15	18	13	16	0	100	10	10.0	
TOTAL	28	26	19	22	25	29	30	23	31	20	253	10	25.3	

E = Excluded fourth brood neonates

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	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	3	3	1	3	3	3	2	0	3	3	24	10	2.40	
5	0	0	0	0	0	0	0	2	0	0	2	10	0.200	
6	8	10	10	12	8	6	10	0	10	11	85	10	8.50	
7	0	0	10	0	0	0	0	8	0	0	18	10	1.80	
8	18	6	0	17	16	18	15	10	14	12	126	10	12.6	
TOTAL	29	19	21	32	27	27	27	20	27	26	255	10	25.5	

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: October 22, 2013 at 1305

Date and Time Test Terminated: October 30, 2013 at 1320

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	0	4	2	3	0	4	0	1	3	1	18	10	1.80	
5	3	0	0	0	0	0	0	0	0	0	3	10	0.300	
6	8	7	9	10	10	10	0	1	10	5	70	10	7.00	
7	0	0	0	14	0	0	12	14	0	0	40	10	4.00	
8	10	17	16	0	16	14	0	0	X	17	90	9	10.0	
TOTAL	21	28	27	27	26	28	12	16	13	23	221	10	22.1	

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	3	2	0	3	2	0	4	0	0	0	14	10	1.40
5	0	0	0	0	0	4	0	0	3	0	7	10	0.700
6	8	4	0	10	8	10	10	0	8	9	67	10	6.70
7	0	0	9	0	0	0	12	0	0	0	21	10	2.10
8	14	8	10	13	14	14	15	14	10	17	129	10	12.9
TOTAL	25	14	19	26	24	28	29	26	21	26	238	10	23.8

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	0	0	0	0	0	0	10	0.00
4	2	0	0	0	0	0	0	0	0	0	2	10	0.200
5	0	0	0	0	0	4	0	0	2	2	8	10	0.800
6	6	8	4	4	2	4	6	0	4	8	46	10	4.60
7	0	0	9	0	0	0	0	0	0	0	9	10	0.900
8	13	15X	13	8	13	15	13	X	11	17	118	8	14.8
TOTAL	21	23	26	12	15	23	19	0	17	27	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	1.00000	1.39310	
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	1.00000	1.39310	
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	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	0.75000	1.04720	
6	100 %	3	0.75000	1.04720	
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))
D = 0.1436		
W = 0.5593		
Critical W = 0.9	(alpha = 0.01, N = 30)	
Critical W = 0.927	(alpha = 0.05, N = 30)	
Data FAIL normality test (alpha = 0.01).		

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 %	27.50	16.00	5.00	
3	42 %	27.50	16.00	5.00	
4	56 %	27.50	16.00	5.00	
5	75 %	27.50	16.00	5.00	
6	100 %	22.50	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 = 0.05774 W = 0.9562 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 = 16.99 Critical B = 15.086 (alpha = 0.01, df = 5)</p> <p>Data FAIL B1 homogeneity test at 0.01 level.</p>		

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 %	27.00	16.00	5.00	
3	42 %	30.00	16.00	5.00	
4	56 %	19.00	16.00	5.00	
5	75 %	24.00	16.00	5.00	
6	100 %	16.50	16.00	5.00	
Critical values are 1 tailed (k=5)					

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Growth

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

ANOVA Table				No Transformation	
SOURCE	DF	SS	MS	F	
Between	5	0.08444	0.01689	7.017	
Within (Error)	24	0.05776	0.002407		
Total	29	0.1422			
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	0.3462	0.3462			
2	32 %	0.3366	0.3366	0.3094		
3	42 %	0.3434	0.3434	0.09024		
4	56 %	0.253	0.253	3.004	*	
5	75 %	0.3004	0.3004	1.476		
6	100 %	0.2032	0.2032	4.609	*	
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	0.07323	21.2	0.0096	
3	42 %	5	0.07323	21.2	0.0028	
4	56 %	5	0.07323	21.2	0.0932	
5	75 %	5	0.07323	21.2	0.0458	
6	100 %	5	0.07323	21.2	0.143	

Appendix A2: Statistics

Ceriodaphnia dubia Survival

Fisher's Exact Test			
Identification	Alive	Dead	Total Animals
Control	10	0	10
32 %	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
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 %	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
75 %	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.

Appendix A2: Statistics

Ceriodaphnia dubia Survival

Fisher's Exact Test			
Identification	Alive	Dead	Total Animals
Control	10	0	10
100 %	8	2	10
Total	18	2	20

Critical Fisher's value (10,10,10) ($\alpha=0.05$) is 6. b value is 8. 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	0	
2	42 %	10	0	
3	56 %	10	1	
4	75 %	10	0	
5	100 %	10	2	

Appendix A2: Statistics

Ceriodaphnia dubia Reproduction

Kolmogorov Test for Normality	No Transformation
D = 0.1493 D* = 1.171 Critical D* = 1.035 (alpha = 0.01, N = 60)	
Data FAIL 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 %	130.50	75.00	10.00	
3	42 %	133.00	75.00	10.00	
4	56 %	117.50	75.00	10.00	
5	75 %	131.00	75.00	10.00	
6	100 %	97.50	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	237.1	47.42	2.212	
Within (Error)	52	1115	21.44		
Total	57	1352			
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	20.7	20.7			
2	32 %	25.3	25.3	-2.221		
3	42 %	25.5	25.5	-2.318		
4	56 %	23.111	23.111	-1.133		
5	75 %	23.8	23.8	-1.497		
6	100 %	20.333	20.333	0.1725		
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	10				
2	32 %	10	4.783	23.1	-4.6	
3	42 %	10	4.783	23.1	-4.8	
4	56 %	9	4.915	23.7	-2.411	
5	75 %	10	4.783	23.1	-3.1	
6	100 %	9	4.915	23.7	0.367	

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: October 22, 2013 at 0846

Date and Time Test Terminated: October 30, 2013 at 1320

Effluent Conc.: Control	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
DO, mg/l	Initial	8.0	7.6	8.2	8.3	8.7	8.5	7.9
	Final *1	8.2	8.0	8.1	8.1	8.8	7.9	7.3
	Final *2	8.2	8.0	9.2	8.8	8.0	8.2	8.1
pH, units	Initial	7.9	7.7	7.9	7.8	7.9	7.9	8.0
	Final *1	7.8	7.8	7.7	7.7	7.7	7.9	7.7
	Final *2	7.9	8.1	8.0	8.2	8.1	8.2	8.2
Alkalinity, mg CaCO ₃ /l	63	NA	63	NA	63	NA	NA	
Hardness, mg CaCO ₃ /l	84	NA	86	NA	86	NA	NA	
Conductivity, umhos/cm	330	340	310	310	310	320	300	
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	8.1	7.5	8.1	8.1	8.8	8.7	8.0
	Final *1	8.0	8.0	8.4	8.1	8.8	7.6	7.5
	Final *2	8.2	8.4	9.0	8.8	8.5	8.3	8.3
pH, units	Initial	7.8	7.8	8.0	7.8	7.8	7.8	7.9
	Final *1	7.9	7.9	7.8	7.8	7.8	7.9	7.7
	Final *2	8.2	8.3	8.3	8.4	8.4	8.5	8.4

Effluent Conc.: 42 %	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
DO, mg/l	Initial	8.1	7.5	8.2	8.0	9.0	8.9	8.0
	Final *1	7.7	8.0	8.3	8.5	8.8	7.5	7.7
	Final *2	8.4	8.4	9.0	8.8	8.5	8.6	8.0
pH, units	Initial	7.8	7.9	7.9	7.7	7.9	7.8	7.8
	Final *1	8.0	8.0	7.9	7.9	7.9	7.9	7.8
	Final *2	8.3	8.3	8.3	8.4	8.3	8.6	8.5

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: October 22, 2013 at 0846

Date and Time Test Terminated: October 30, 2013 at 1320

Effluent Conc.: 56 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.1	7.5	8.1	8.0	8.9	8.8	8.1
	Final *1	7.9	8.0	8.0	8.3	8.8	7.8	7.6
	Final *2	8.3	8.1	8.9	8.9	8.6	8.4	8.2
pH, units	Initial	7.8	7.9	8.0	7.7	7.9	7.7	7.8
	Final *1	8.0	8.0	7.9	7.9	7.9	8.0	7.8
	Final *2	8.3	8.4	8.3	8.5	8.4	8.6	8.4

Effluent Conc.: 75 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.2	7.5	7.7	8.3	8.7	8.8	8.2
	Final *1	8.0	7.9	8.0	8.5	8.8	7.8	7.4
	Final *2	8.3	7.9	8.8	8.8	8.6	8.5	8.1
pH, units	Initial	7.8	8.0	8.0	7.7	7.8	7.7	7.8
	Final *1	8.0	8.0	7.9	8.0	7.9	8.0	7.9
	Final *2	8.3	8.4	8.3	8.5	8.4	8.6	8.5

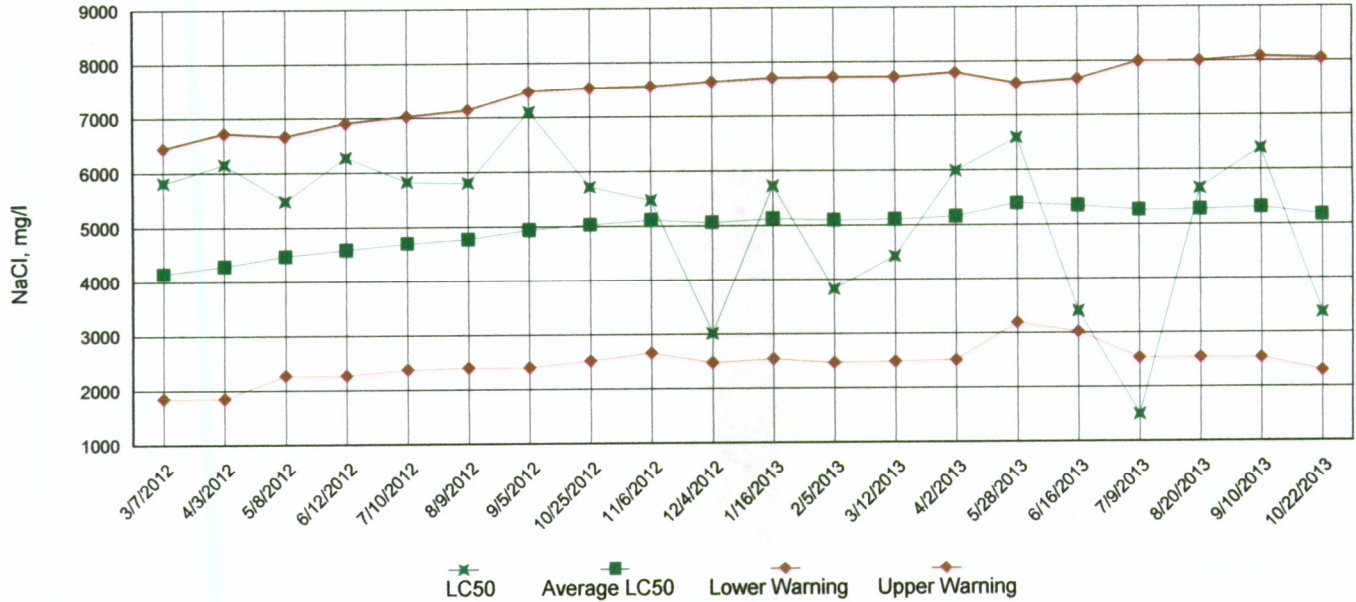
Effluent Conc.: 100 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.2	7.5	8.0	7.8	9.0	9.2	7.8
	Final *1	7.7	8.0	7.7	8.4	8.8	7.6	7.5
	Final *2	8.3	8.5	8.9	8.9	8.6	8.7	8.2
pH, units	Initial	7.8	8.1	7.9	7.8	8.0	7.6	8.1
	Final *1	8.1	8.1	8.0	8.0	8.0	8.0	8.0
	Final *2	8.4	8.5	8.4	8.5	8.4	8.6	8.5
Alkalinity, mg CaCO ₃ /l	130	NA	120	NA	100	NA	NA	
Hardness, mg CaCO ₃ /l	210	NA	220	NA	240	NA	NA	
Conductivity, umhos/cm	1000	1000	1000	980	980	980	970	
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

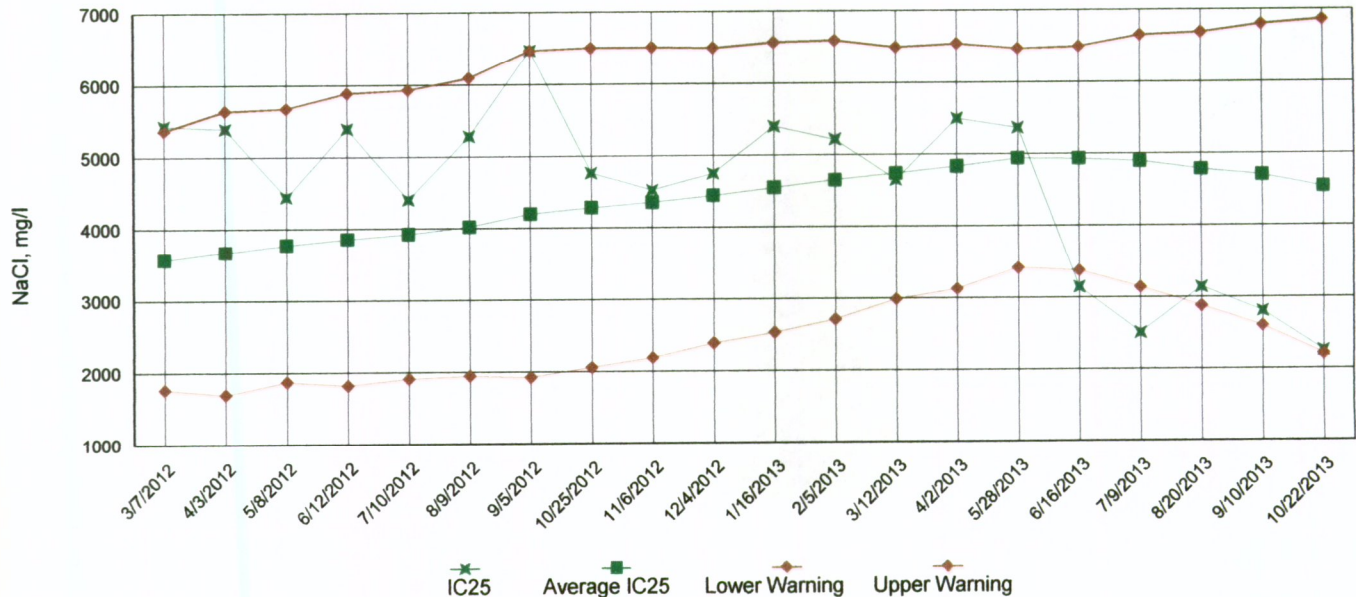
Appendix A4: Test 1000.0

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

LC50 Survival Data



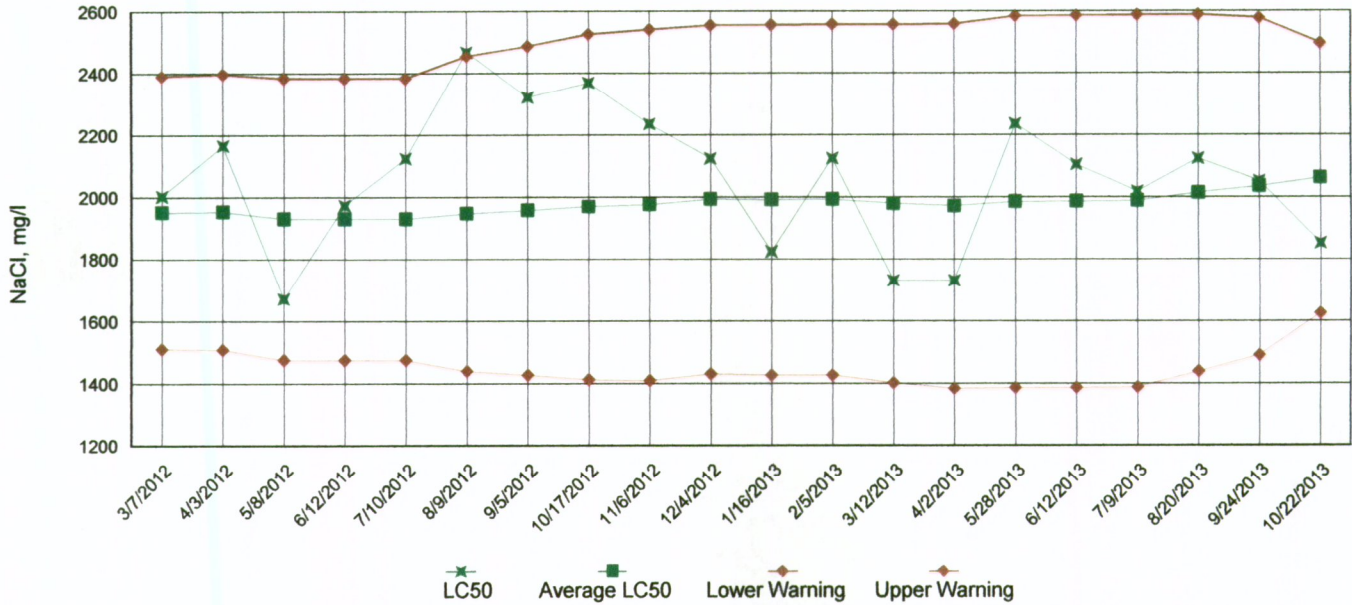
IC25 Growth Data



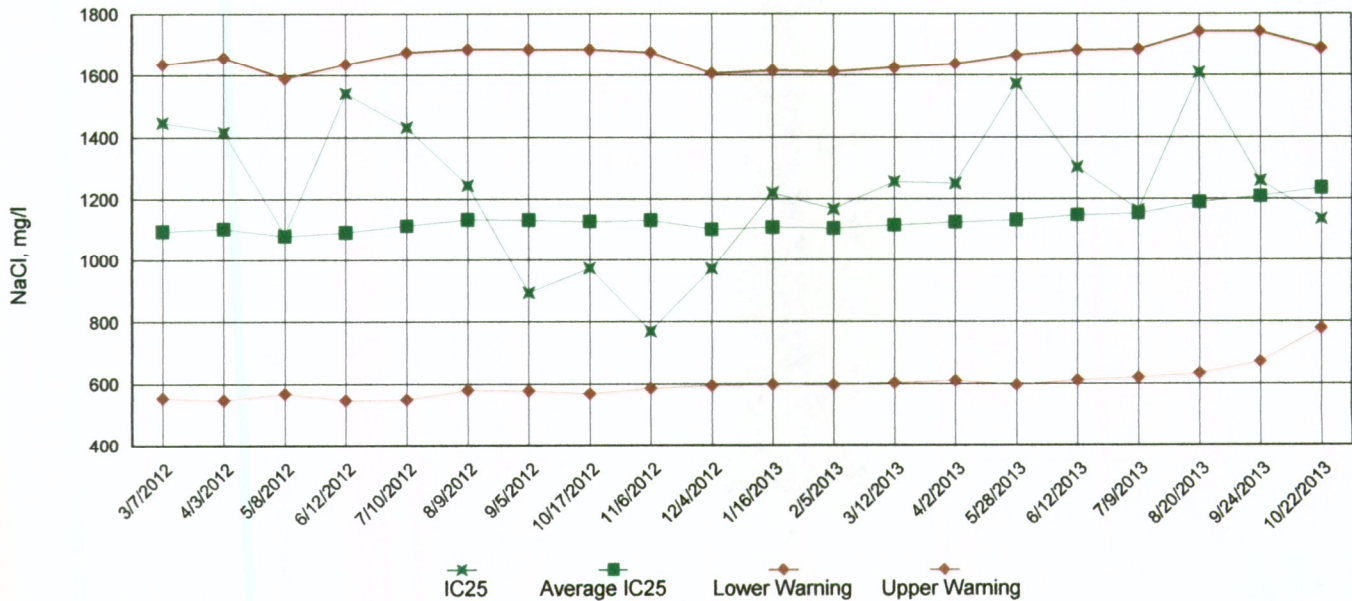
Appendix A4: Test 1002.0

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: October 22, 2013 at 1120

Date and Time Test Terminated: October 29, 2013 at 1243

Dilution water used: Synthetic Moderately Hard Water #4030

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 %	100	100	100	100	100	100	100	100	0.00
42 %	100	100	100	100	100	100	100	100	0.00
56 %	100	100	100	100	100	100	100	100	0.00
75 %	100	100	100	100	100	100	100	100	0.00
100 %	100	75.0	75.0	100	100	100	100	90.0	15.2

DATA TABLE FOR GROWTH

Effluent Conc. %	Average dry weight, mg replicate chambers					Mean dry weight, mg	CV%
	A	B	C	D	E		
Control	0.290	0.356	0.349	0.484	0.252	0.346	25.5
32 %	0.310	0.328	0.340	0.331	0.374	0.337	7.00
42 %	0.298	0.359	0.341	0.354	0.365	0.343	7.83
56 %	0.198	0.201	0.282	0.279	0.305	0.253	19.7
75 %	0.286	0.311	0.299	0.302	0.304	0.3	3.06
100 %	0.176	0.151	0.169	0.268	0.252	0.203	26.1

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	<u> X </u> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	_____ YES	_____ NO

2. Steel's Many-One Rank 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]: | <u> 0 </u> | (TLP6C) |
| 4. If you answered NO to 2.a) enter [0] otherwise enter [1]: | <u> 0 </u> | (TGP6C) |
| 5. NOEC Pimephales Lethality: | <u> 100 % </u> | (TOP6C) |
| 6. LOEC Pimephales Lethality: | <u> 100 % </u> | (TXP6C) |
| 7. NOEC Pimephales Sublethality: | <u> 100 % </u> | (TPP6C) |
| 8. LOEC Pimephales Sublethality: | <u> 100 % </u> | (TYP6C) |
| 9. Coefficient of variation for Pimephales growth: | <u> 26.1 </u> | (TQP6C) |

Appendix B: Test 1000.0

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

PERMITTEE: Huntsville Water Utilities SAMPLE No. 1 COLLECTED ending: DATE: October 21, 2013 TIME: 0500
 NPDES NO.: AR0022004 AFIN# 44-00018 SAMPLE No. 2 COLLECTED ending: DATE: October 23, 2013 TIME: 0500
 CONTACT: Mr. Bill Eoff SAMPLE No. 3 COLLECTED ending: DATE: October 25, 2013 TIME: 0500
 ANALYST: 280, 298, 304, 307 Test Initiated: DATE: October 22, 2013 TIME: 1120
 Test Terminated: DATE: October 29, 2013 TIME: 1243

DILUTION Control	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	7.6	8.2	8.3	8.7	8.5	7.9
Final	8.2	8.0	8.1	8.1	8.8	7.9	7.3
pH Initial	7.9	7.7	7.9	7.8	7.9	7.9	8.0
Final	7.8	7.8	7.7	7.7	7.7	7.9	7.7
Alkalinity	63	NA	63	NA	63	NA	NA
Hardness	84	NA	86	NA	86	NA	NA
Conductivity	330	340	310	310	310	320	300
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 32 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.1	7.5	8.1	8.1	8.8	8.7	8.0
Final	8.0	8.0	8.4	8.1	8.8	7.6	7.5
pH Initial	7.8	7.8	8.0	7.8	7.8	7.8	7.9
Final	7.9	7.9	7.8	7.8	7.8	7.9	7.7
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	560	560	550	520	520	530	520
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 42 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.1	7.5	8.2	8.0	9.0	8.9	8.0
Final	7.7	8.0	8.3	8.5	8.8	7.5	7.7
pH Initial	7.8	7.9	7.9	7.7	7.9	7.8	7.8
Final	8.0	8.0	7.9	7.9	7.9	7.9	7.8
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	630	640	620	590	590	600	590
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 56 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.1	7.5	8.1	8.0	8.9	8.8	8.1
Final	7.9	8.0	8.0	8.3	8.8	7.8	7.6
pH Initial	7.8	7.9	8.0	7.7	7.9	7.7	7.8
Final	8.0	8.0	7.9	7.9	7.9	8.0	7.8
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	720	730	710	680	680	690	680
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 75 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.2	7.5	7.7	8.3	8.7	8.8	8.2
Final	8.0	7.9	8.0	8.5	8.8	7.8	7.4
pH Initial	7.8	8.0	8.0	7.7	7.8	7.7	7.8
Final	8.0	8.0	7.9	8.0	7.9	8.0	7.9
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	850	870	840	800	800	820	810
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 100 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.2	7.5	8.0	7.8	9.0	9.2	7.8
Final	7.7	8.0	7.7	8.4	8.8	7.6	7.5
pH Initial	7.8	8.1	7.9	7.8	8.0	7.6	8.1
Final	8.1	8.1	8.0	8.0	8.0	8.0	8.0
Alkalinity	130	NA	120	NA	100	NA	NA
Hardness	210	NA	220	NA	240	NA	NA
Conductivity	1000	1000	1000	980	980	980	970
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: October 22, 2013 at 1305

Date and Time Test Terminated: October 30, 2013 at 1320

Dilution water used: Synthetic Moderately Hard Water #4030

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
8 day	100	100	100	90.0	100	80.0

NUMBER OF YOUNG PRODUCED PER FEMALE @ 8 DAYS

Replicates	Control	Percent Effluent				
		32 %	42 %	56 %	75 %	100 %
A	20	28	29	21	25	21
B	22	26	19	28	14	23
C	21	19	21	27	19	26
D	24	22	32	27	26	12
E	23	25	27	26	24	15
F	23	29	27	28	28	23
G	13	30	27	12	29	19
H	14	23	20	16	26	0
I	24	31	27	13	21	17
J	23	20	26	23	26	27
Mean per Adult	20.7	25.3	25.5	22.1	23.8	18.3
Mean per Surviving Adult	20.7	25.3	25.5	23.1	23.8	20.0
CV %	19.3	16.7	16.4	24.9	19.2	26.3

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	<u> X </u> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	_____ YES	_____ 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 %)	_____ 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 (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: 26.3 (TQP3B)

Appendix B: Test 1002.0

CHRONIC TOXICITY SUMMARY FORM
Ceriodaphnia dubia
CHEMICAL PARAMETERS CHART

PERMITTEE: Huntsville Water Utilities SAMPLE No. 1 COLLECTED ending: DATE: October 21, 2013 TIME: 0500
 NPDES NO.: AR0022004 AFIN# 44-00018 SAMPLE No. 2 COLLECTED ending: DATE: October 23, 2013 TIME: 0500
 CONTACT: Mr. Bill Eoff SAMPLE No. 3 COLLECTED ending: DATE: October 25, 2013 TIME: 0500
 ANALYST: 280, 298, 304, 307 Test Initiated: DATE: October 22, 2013 TIME: 1305
 Test Terminated: DATE: October 30, 2013 TIME: 1320

DILUTION Control	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	7.6	8.2	8.3	8.7	8.5	7.9
Final	8.2	8.0	9.2	8.8	8.0	8.2	8.1
pH Initial	7.9	7.7	7.9	7.8	7.9	7.9	8.0
Final	7.9	8.1	8.0	8.2	8.1	8.2	8.2
Alkalinity	63	NA	63	NA	63	NA	NA
Hardness	84	NA	86	NA	86	NA	NA
Conductivity	330	340	310	310	310	320	300
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 32 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.1	7.5	8.1	8.1	8.8	8.7	8.0
Final	8.2	8.4	9.0	8.8	8.5	8.3	8.3
pH Initial	7.8	7.8	8.0	7.8	7.8	7.8	7.9
Final	8.2	8.3	8.3	8.4	8.4	8.5	8.4
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	560	560	550	520	520	530	520
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 42 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.1	7.5	8.2	8.0	9.0	8.9	8.0
Final	8.4	8.4	9.0	8.8	8.5	8.6	8.0
pH Initial	7.8	7.9	7.9	7.7	7.9	7.8	7.8
Final	8.3	8.3	8.3	8.4	8.3	8.6	8.5
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	630	640	620	590	590	600	590
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 56 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.1	7.5	8.1	8.0	8.9	8.8	8.1
Final	8.3	8.1	8.9	8.9	8.6	8.4	8.2
pH Initial	7.8	7.9	8.0	7.7	7.9	7.7	7.8
Final	8.3	8.4	8.3	8.5	8.4	8.6	8.4
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	720	730	710	680	680	690	680
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 75 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.2	7.5	7.7	8.3	8.7	8.8	8.2
Final	8.3	7.9	8.8	8.8	8.6	8.5	8.1
pH Initial	7.8	8.0	8.0	7.7	7.8	7.7	7.8
Final	8.3	8.4	8.3	8.5	8.4	8.6	8.5
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	850	870	840	800	800	820	810
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 100 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.2	7.5	8.0	7.8	9.0	9.2	7.8
Final	8.3	8.5	8.9	8.9	8.6	8.7	8.2
pH Initial	7.8	8.1	7.9	7.8	8.0	7.6	8.1
Final	8.4	8.5	8.4	8.5	8.4	8.6	8.5
Alkalinity	130	NA	120	NA	100	NA	NA
Hardness	210	NA	220	NA	240	NA	NA
Conductivity	1000	1000	1000	980	980	980	970
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

PAGE OF

Client: <u>Huntsville Water Utilities</u>			PO No.		NO OF BOTTLES	ANALYSES REQUESTED										AIC CONTROL NO: <u>171765</u>						
Project Reference: <u>Bio Monitoring</u>			SAMPLE MATRIX			Cd & Pb Chronic														AIC PROPOSAL NO:		
Project Manager: <u>Bill Eoff</u>			GRA	COMP	WATER		SOIL	BOTTLES	Cd & Pb Chronic												Carrier: <u>Fed-X</u>	
Sampled By: <u>Bill Eoff</u>																Received on Ice (4°C)? <u>(YES) 21°C NO</u>						
AIC No.	Sample Identification	Date/Time Collected																		Remarks		
<u>2</u>	<u>Huntsville #2</u>	<u>10/22/13 @ 7:00 A - 10/23/13 @ 5:00 A</u>		X	X			3	X													
		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) NORMAL or EXPEDITED IN _____ DAYS						Relinquished By: <u>BME</u>		Date/Time: <u>10/23/13 @ 8:00 A</u>		Received By:		Date/Time:										
Expedited results requested by: _____						Relinquished By:		Date/Time:		Received in Lab By: <u>Lupe Hopton</u>		Date/Time: <u>10-24-13 0800</u>										
Who should AIC contact with questions: <u>Bill Eoff</u>						Comments:																
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</u> <u>Huntsville Water Utilities</u> <u>P.O. Box 430</u>																						

8764 3753 3713



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CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

PAGE OF

Client: <u>Huntsville Water Utilities</u>			PO No.		NO OF BOTTLES	ANALYSES REQUESTED										AIC CONTROL NO: <u>171765</u>					
Project Reference: <u>Bio Monitoring</u>			SAMPLE MATRIX			Cd & Fh Chronic															
Project Manager: <u>Bill Eoff</u>			GRA B	COMP	WATER		SOIL	BOTTLES	Cd & Fh Chronic											Carrier:	
Sampled By: <u>Bill Eoff</u>																Received on Ice (4°C)? <u>YES</u> 2.0 NO					
AIC No.	Sample Identification	Date/Time Collected	GRA B	COMP	WATER	SOIL	BOTTLES	Cd & Fh Chronic													Remarks
<u>3</u>	<u>Huntsville #3</u>	<u>10/24/13 @ 7:00 AM</u> <u>10/25/13 @ 5:00 AM</u>		X	X		3	X													
		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)
 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>10/25/13 @ 8:00 AM</u>	Received By: _____	Date/Time: _____
Relinquished By: _____	Date/Time: _____	Received in Lab By: <u>SLH</u>	Date/Time: <u>10/26/13</u>
Comments: _____			

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



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

