

November 16, 2015

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

Control No. 195561-1

Prepared for:

Mr. Bill Eoff
Huntsville Water Utilities
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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:

The statistically significant difference noted for survival and growth with the Fathead Minnow at 56% effluent does not follow a dose response pattern and is considered an anomaly.

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

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ATTN: Mr. Bill Eoff
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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	0.472	PASS
Control Growth CV < or = 40%	2.05	PASS
Growth Minimum Significant Difference 12 to 30%	12.5	PASS
Critical Dilution CV < or = 40%	11.0	PASS

Ceriodaphnia dubia Method 1002.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	100	PASS
Control Reproduction > or = 15 per Surviving Female	19.2	PASS
Control CV < or = 40% per Surviving Female	27.8	PASS
Reproduction Minimum Significant Difference 13 to 47%	23.8	PASS
Critical Dilution CV < or = 40%	23.7	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)	7.5	7.7	7.6
pH (standard units)	7.5	7.4	7.5
Alkalinity (mg/l as CaCO ₃)	66	120	64
Hardness (mg/l as CaCO ₃)	170	170	170
Conductivity (umhos/cm)	910	920	880
Residual Chlorine (mg/l)	0.10	0.10	<0.05
Ammonia as N (mg/l)	<0.1	6.0	<0.1

2. Dilution Water Samples: Synthetic Moderately Hard Water #4261

- a. Dates Prepared: October 27 to November 11, 2015
- b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	7.2	7.7	7.8
pH (standard units)	7.9	7.8	7.8
Alkalinity (mg/l as CaCO ₃)	60	57	57
Hardness (mg/l as CaCO ₃)	81	81	81
Conductivity (umhos/cm)	280	320	230
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 27, 2015 at 1820
Date & Time Test Terminated: November 3, 2015 at 1620
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 27, 2015 at 1440
Date & Time Test Terminated: November 2, 2015 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 and Bartlett's test. The survival data was then analyzed using Dunnett's 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.

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 October 21, 2015 at 1600 to October 28, 2015 at 1530

The results were as follows: (Control No. 195350-1.)

Survival LC-50: 4872 mg/l

Growth IC-25: 3595 mg/l

Growth PMSD: 13

Ceriodaphnia dubia

Chronic reference tests are performed monthly.

A chronic reference test was performed on October 21, 2015 at 1400 to October 27, 2015 at 1550

The results were as follows: (Control No. 195350-2.)

Survival LC-50: 1732 mg/l

Growth IC-25: 879.2 mg/l

Growth PMSD: 20.2

V. Chemical Analysis/Quality Control

Parameter	Method	% Recovery	Relative % Difference
Alkalinity	SM 2320 B	NA	0.00
Hardness	EPA 200.7	99.9	2.92
pH	SM 4500-H+ B	101	0.00
Conductivity	EPA 120.1	96.2	3.53

VI. Organism History

Pimephales promelas (Fathead minnow)

Date: October 27, 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: October 27, 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

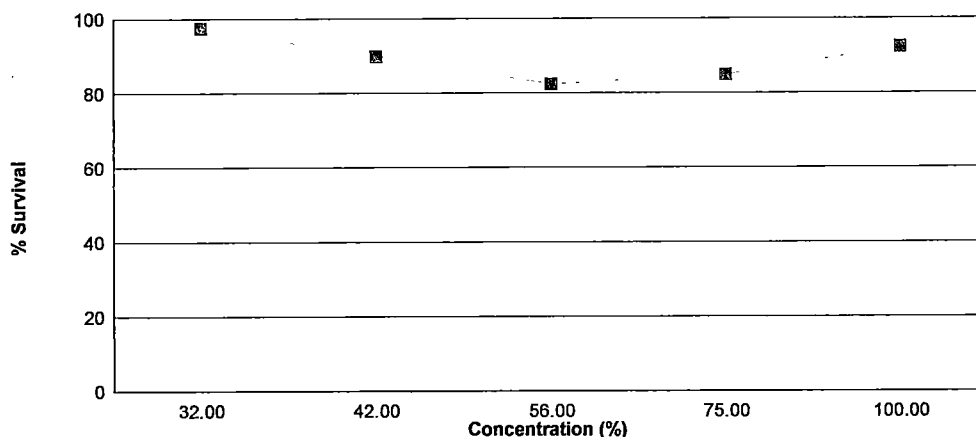
Larvae are exposed in a static renewal system for seven days to different concentrations of effluent with dilution water. Test results are based on the survival and growth (increase in weight) of the larvae.

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 October 27, 2015 at 1820 and continued through November 3, 2015 at 1620. 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	0.460
32 %	97.5	0.484
42 %	90.0	0.456
56 %	82.5 *	0.382 *
75 %	85.0	0.422
100 %	92.5	0.413

*Significant difference when compared to the control (p=0.05)

The significant toxicity is not due to true dose response effects, and should be considered an anomaly.

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

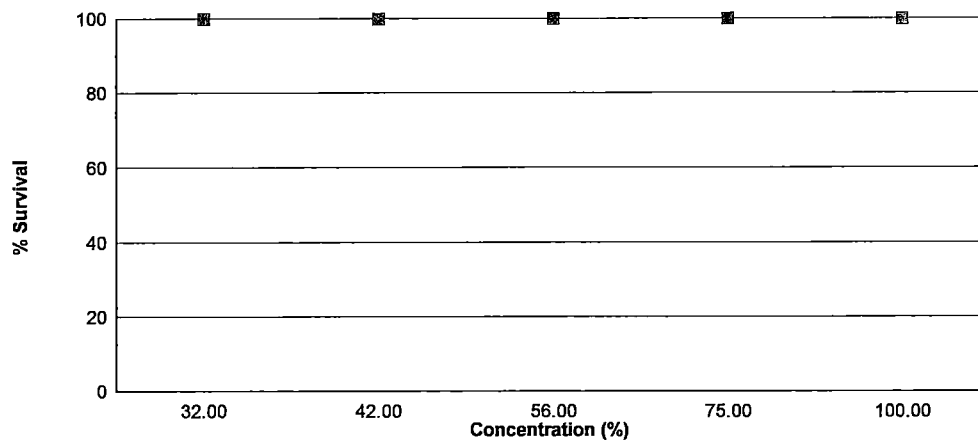
Neonates are exposed in a static renewal system to different concentrations of effluent with dilution water until 60% of surviving control organisms have three broods of offspring with an average of at least 15 young per female.

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 27, 2015 at 1440 and continued through November 2, 2015 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



Summary of the 6-day <i>Ceriodaphnia dubia</i> Survival and Reproduction Data		
Concentration	Percent Survival	Mean Reproduction
Control	100	19.2
32 %	100	26.4
42 %	100	24.6
56 %	100	22.4
75 %	100	27.0
100 %	100	27.2

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Survival

Date and Time Test Initiated: October 27, 2015 at 1820
Date and Time Test Terminated: November 3, 2015 at 1620

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

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Growth

Test Initiated: October 27, 2015 at 1820
Test Terminated: November 3, 2015 at 1620

Drying Started: October 29, 2015 at 1440
Drying Ended: November 5, 2015 at 0900

Concentration	Replicate	Weight of pan	Weight of pan + fish	Total weight of fish (g)	Original # of fish	Mean dry weight (mg)
Control	A	.94395	.94752	0.00357	8	0.446
	B	.94929	.95302	0.00373	8	0.466
	C	.94028	.94400	0.00372	8	0.465
	D	.94499	.94873	0.00374	8	0.468
	E	.93694	.94057	0.00363	8	0.454
32 %	A	.93564	.93968	0.00404	8	0.505
	B	.93932	.94268	0.00336	8	0.420
	C	.93797	.94189	0.00392	8	0.490
	D	.94019	.94435	0.00416	8	0.520
	E	.94292	.94679	0.00387	8	0.484
42 %	A	.93746	.94076	0.00330	8	0.412
	B	.94101	.94496	0.00395	8	0.494
	C	.94131	.94548	0.00417	8	0.521
	D	.93990	.94303	0.00313	8	0.391
	E	.93944	.94312	0.00368	8	0.460
56 %	A	.94696	.94988	0.00292	8	0.365
	B	.94627	.94941	0.00314	8	0.392
	C	.94394	.94666	0.00272	8	0.340
	D	.93541	.93872	0.00331	8	0.414
	E	.94437	.94758	0.00321	8	0.401
75 %	A	.93943	.94236	0.00293	8	0.366
	B	.93976	.94308	0.00332	8	0.415
	C	.94099	.94475	0.00376	8	0.470
	D	.93534	.93886	0.00352	8	0.440
	E	.94422	.94756	0.00334	8	0.418
100 %	A	.93950	.94234	0.00284	8	0.355
	B	.93834	.94138	0.00304	8	0.380
	C	.94558	.94915	0.00357	8	0.446
	D	.93720	.94054	0.00334	8	0.418
	E	.94437	.94808	0.00371	8	0.464

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: October 27, 2015 at 1440
Date and Time Test Terminated: November 2, 2015 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	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	4	4	4	0	5	0	0	4	0	21	10	2.10	
4	5	0	0	0	0	6	4	3	4	3	25	10	2.50	
5	0	8	4	8	7	1	0	6	6	10	50	10	5.00	
6	9	11	7	11	10	12	5	11	12	8	96	10	9.60	
7														
8														
TOTAL	14	23	15	23	17	24	9	20	26	21	192	10	19.2	

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	4	3	4	4	4	4	0	5	4	0	32	10	3.20	
4	0	0	0	0	0	0	2	0	0	4	6	10	0.600	
5	10	10	12	8	9	9	7	7	12	10	94	10	9.40	
6	16	14	17	13	15	13	12	9	14	9	132	10	13.2	
7														
8														
TOTAL	30	27	33	25	28	26	21	21	30	23	264	10	26.4	

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	5	4	4	4	2	4	0	4	4	0	31	10	3.10	
4	0	0	0	0	3	4	2	0	0	3	12	10	1.20	
5	9	10	7	10	8	0	8	8	10	7	77	10	7.70	
6	16	13	15	12	11	14	11	14	11	9	126	10	12.6	
7														
8														
TOTAL	30	27	26	26	24	22	21	26	25	19	246	10	24.6	

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: October 27, 2015 at 1440
Date and Time Test Terminated: November 2, 2015 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	4	0	5	4	4	4	0	3	4	0	28	10	2.80	
4	0	0	0	0	0	0	3	0	3	4	10	10	1.00	
5	9	8	7	8	8	7	5	6	6	7	71	10	7.10	
6	13	10	8	11	11	14	13	9	11	15	115	10	11.5	
7														
8														
TOTAL	26	18	20	23	23	25	21	18	24	26	224	10	22.4	

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	4	3	4	4	4	3	0	4	5	0	31	10	3.10	
4	0	0	0	0	0	0	2	0	0	5	7	10	0.700	
5	11	4	10	9	9	12	9	11	7	9	91	10	9.10	
6	17	13	12	15	14	16	13	14	14	13	141	10	14.1	
7														
8														
TOTAL	32	20	26	28	27	31	24	29	26	27	270	10	27.0	

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	3	4	4	3	3	4	0	2	0	0	23	10	2.30	
4	0	0	0	0	0	0	0	0	5	4	9	10	0.900	
5	11	11	9	11	8	9	3	9	11	0	82	10	8.20	
6	18	21	15	17	17	19	13	10	13	15	158	10	15.8	
7														
8														
TOTAL	32	36	28	31	28	32	16	21	29	19	272	10	27.2	

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	0.87500	1.20940
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	0.87500	1.20940
3	42 %	1	1.00000	1.39310
3	42 %	2	0.87500	1.20940
3	42 %	3	1.00000	1.39310
3	42 %	4	0.75000	1.04720
3	42 %	5	0.87500	1.20940
4	56 %	1	0.75000	1.04720
4	56 %	2	1.00000	1.39310
4	56 %	3	0.75000	1.04720
4	56 %	4	0.87500	1.20940
4	56 %	5	0.75000	1.04720
5	75 %	1	0.87500	1.20940
5	75 %	2	0.75000	1.04720
5	75 %	3	1.00000	1.39310
5	75 %	4	0.87500	1.20940
5	75 %	5	0.75000	1.04720
6	100 %	1	1.00000	1.39310
6	100 %	2	1.00000	1.39310
6	100 %	3	0.87500	1.20940
6	100 %	4	0.87500	1.20940
6	100 %	5	0.87500	1.20940

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Survival

Shapiro - Wilk's Test for Normality	Transform: Arc Sin(Square Root(Y))
D = 0.3566 W = 0.9548 Critical W = 0.9 Critical W = 0.927	(alpha = 0.01, N = 30) (alpha = 0.05, N = 30)
Data PASS normality test (alpha = 0.01).	

Bartlett's Test for Homogeneity of Variance	Transform: Arc Sin(Square Root(Y))
Calculated B1 statistic = 2.957 Critical B = 15.086	(alpha = 0.01, df = 5)
Data PASS B1 homogeneity test at 0.01 level.	

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Survival

ANOVA Table			Transform: Arc Sin(Square Root(Y))	
SOURCE	DF	SS	MS	F
Between	5	0.1885	0.0377	2.537
Within (Error)	24	0.3566	0.01486	
Total	29	0.5451		
Critical F = 3.9 (alpha = 0.01, df = 5,24)				
2.62 (alpha = 0.05, df = 5,24)				
Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)				

Dunnett's Test - Table 1 of 2				Transform: Arc Sin(Square Root(Y))	
Ho:Control<Treatment					
Group	Identification	Transformed Mean	Mean In Original Units	T Stat	Sig 0.05
1	Control	1.3564	0.975		
2	32 %	1.3564	0.975	0	
3	42 %	1.2504	0.9	1.375	
4	56 %	1.1488	0.825	2.693	*
5	75 %	1.1813	0.85	2.271	
6	100 %	1.2829	0.925	0.9533	
Dunnett's critical value = 2.36 (1 Tailed, alpha = 0.05, df = 5,24)					

Dunnett's Test - Table 2 of 2				Transform: Arc Sin(Square Root(Y))	
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	0.1037	10.9	0
3	42 %	5	0.1037	10.9	0.075
4	56 %	5	0.1037	10.9	0.15
5	75 %	5	0.1037	10.9	0.125
6	100 %	5	0.1037	10.9	0.05

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Growth

Shapiro - Wilk's Test for Normality	No Transformation
<p>D = 0.0356 W = 0.9543 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 = 8.556 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	0.03429	0.006858	4.624	
Within (Error)	24	0.0356	0.001483		
Total	29	0.06989			
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	0.4598	0.4598			
2	32 %	0.4838	0.4838	-0.9854		
3	42 %	0.4556	0.4556	0.1724		
4	56 %	0.3824	0.3824	3.178	*	
5	75 %	0.4218	0.4218	1.56		
6	100 %	0.4126	0.4126	1.938		
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	0.05748	12.5	-0.024	
3	42 %	5	0.05748	12.5	0.0042	
4	56 %	5	0.05748	12.5	0.0774	
5	75 %	5	0.05748	12.5	0.038	
6	100 %	5	0.05748	12.5	0.0472	

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 %	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 %	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 %	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.

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	0	
4	75 %	10	0	
5	100 %	10	0	

Appendix A2: Statistics

Ceriodaphnia dubia Reproduction

Kolmogorov Test for Normality	No Transformation
<p>D = 0.1057 D* = 0.8293 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 = 8.397 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	496.5	99.3	5.087	
Within (Error)	54	1054	19.52		
Total	59	1551			
Critical F = 3.38 (alpha = 0.01, df = 5,54)					
2.38 (alpha = 0.05, df = 5,54)					
Since F > Critical F REJECT Ho: All equal (alpha = 0.05)					

Dunnnett'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	19.2	19.2			
2	32 %	26.4	26.4	-3.644		
3	42 %	24.6	24.6	-2.733		
4	56 %	22.4	22.4	-1.62		
5	75 %	27	27	-3.948		
6	100 %	27.2	27.2	-4.049		
Dunnnett's critical value = 2.31 (1 Tailed, alpha = 0.05, df [used] = 5,40) (Actual df = 5,54)						

Dunnnett'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	4.564	23.8	-7.2	
3	42 %	10	4.564	23.8	-5.4	
4	56 %	10	4.564	23.8	-3.2	
5	75 %	10	4.564	23.8	-7.8	
6	100 %	10	4.564	23.8	-8	

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: October 27, 2015 at 1027
Date and Time Test Terminated: November 3, 2015 at 1620

Effluent Conc.: Control		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.2	7.7	7.7	7.3	7.8	7.8	7.3
	Final *1	7.0	6.8	6.6	6.5	8.5	7.3	5.9
	Final *2	7.8	7.6	7.7	8.0	7.5	7.7	
pH, units	Initial	7.9	7.9	7.8	7.9	7.8	7.6	7.7
	Final *1	8.0	7.4	7.5	7.7	7.6	7.8	7.3
	Final *2	8.2	7.9	8.2	8.4	8.0	8.1	
Alkalinity, mg CaCO ₃ /l		60	NA	57	NA	57	NA	NA
Hardness, mg CaCO ₃ /l		81	NA	81	NA	81	NA	NA
Conductivity, umhos/cm		280	280	320	320	230	240	270
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	7.5	7.5	7.3	7.7	7.7	8.0	7.0
	Final *1	7.3	6.7	6.8	6.6	8.3	7.1	6.2
	Final *2	7.8	7.4	7.4	7.9	7.6	7.9	
pH, units	Initial	7.8	7.9	7.6	7.8	7.8	7.8	7.7
	Final *1	7.9	7.4	7.6	7.8	7.8	7.9	7.6
	Final *2	8.2	7.9	8.2	8.4	8.2	8.2	

Effluent Conc.: 42 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.6	7.5	7.7	7.4	7.7	7.6	7.2
	Final *1	7.2	6.7	7.0	6.5	8.1	7.1	6.1
	Final *2	7.6	7.6	7.5	7.8	7.6	7.8	
pH, units	Initial	7.8	7.8	7.6	7.8	7.7	7.8	7.7
	Final *1	7.8	7.4	7.6	7.8	7.8	7.9	7.6
	Final *2	8.2	8.0	8.2	8.5	8.2	8.2	

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: October 27, 2015 at 1027

Date and Time Test Terminated: November 3, 2015 at 1620

Effluent Conc.: 56 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.7	7.4	7.2	7.0	7.8	7.7	7.4
	Final *1	7.1	6.6	6.9	6.4	8.0	7.0	6.2
	Final *2	7.6	7.2	7.5	7.8	7.7	7.7	
pH, units	Initial	7.7	7.8	7.6	8.0	7.6	7.8	7.6
	Final *1	7.8	7.4	7.6	7.8	7.8	7.9	7.5
	Final *2	8.2	7.9	8.1	8.5	8.1	8.2	

Effluent Conc.: 75 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.6	7.3	7.5	7.6	7.6	7.9	7.2
	Final *1	7.1	6.5	7.0	6.4	7.9	7.3	6.4
	Final *2	7.7	7.5	7.4	7.7	7.5	7.5	
pH, units	Initial	7.6	7.7	7.4	7.8	7.5	7.8	7.6
	Final *1	7.8	7.4	7.6	7.8	7.8	8.0	7.6
	Final *2	8.2	7.9	8.2	8.5	8.1	8.2	

Effluent Conc.: 100 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.5	7.2	7.7	7.7	7.6	7.8	6.9
	Final *1	7.3	6.5	7.1	6.1	7.8	7.2	6.1
	Final *2	7.5	7.3	7.5	7.7	7.5	7.5	
pH, units	Initial	7.5	7.6	7.4	7.9	7.5	7.8	7.5
	Final *1	7.8	7.4	7.6	7.9	7.8	8.0	7.6
	Final *2	8.2	8.0	8.2	8.5	8.2	8.2	
Alkalinity, mg CaCO ₃ /l	66	NA	120	NA	64	NA	NA	NA
Hardness, mg CaCO ₃ /l	170	NA	170	NA	170	NA	NA	NA
Conductivity, umhos/cm	910	920	920	940	880	900	920	
Res. Chlorine, mg/l	0.10	NA	0.10	NA	<0.05	NA	NA	

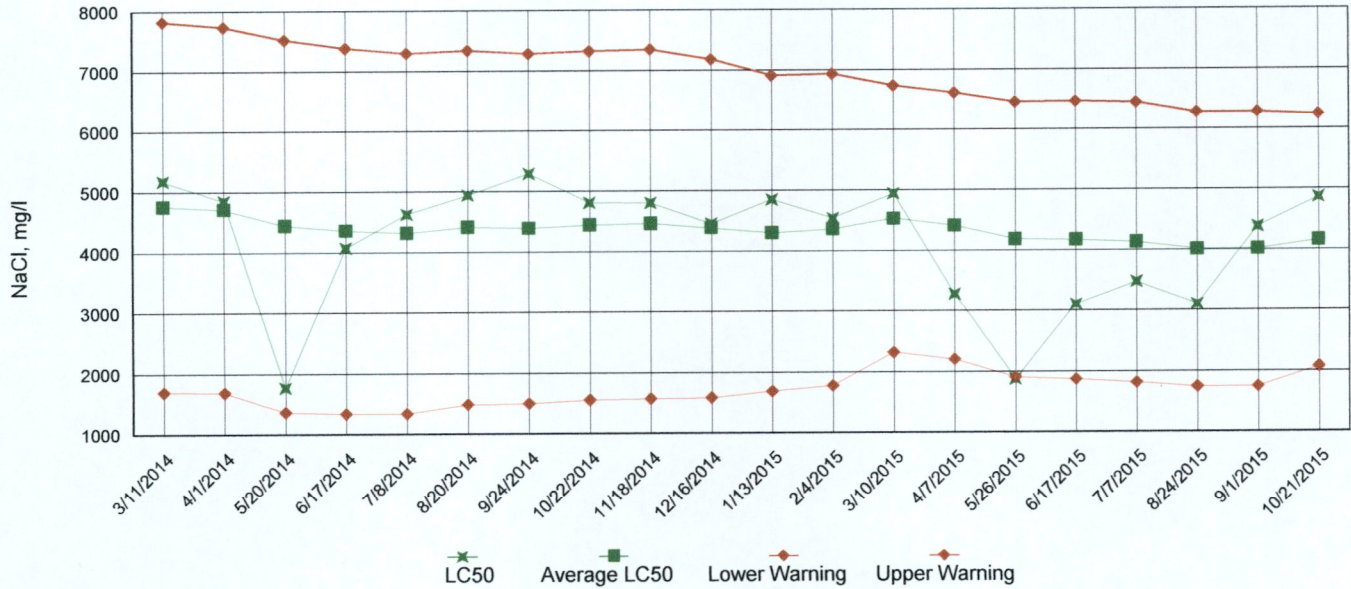
*1 = data from the *Pimephales promelas* (Fathead Minnow) test

*2 = data from the *Ceriodaphnia dubia* test

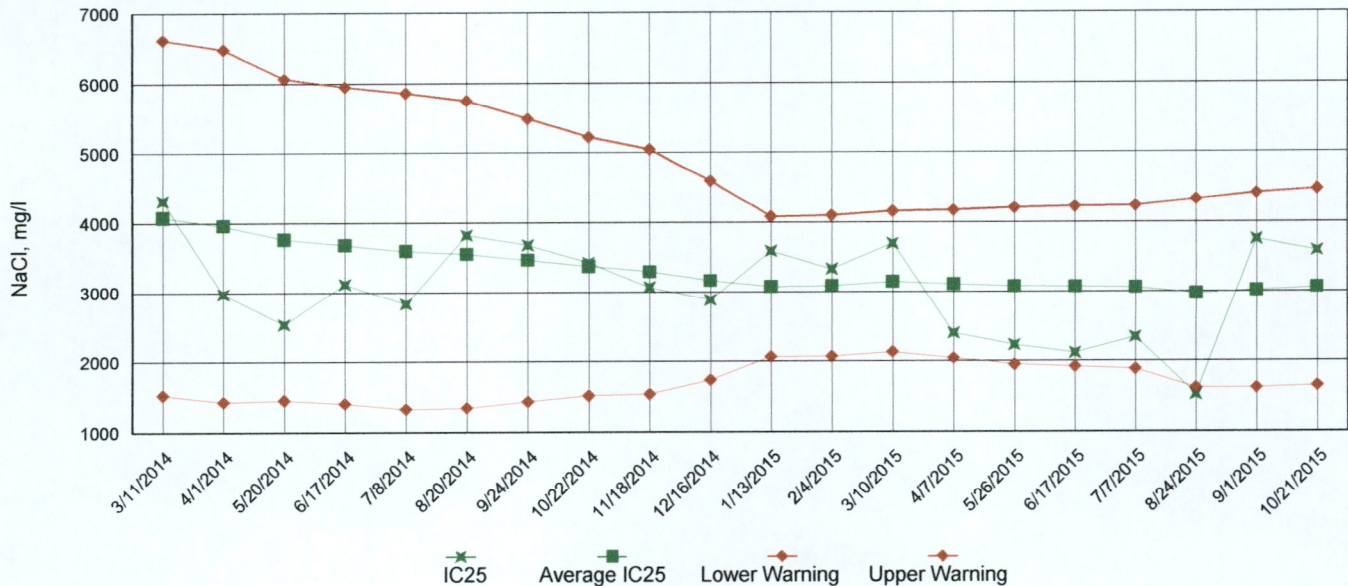
Appendix A4: Test 1000.0

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

LC50 Survival Data



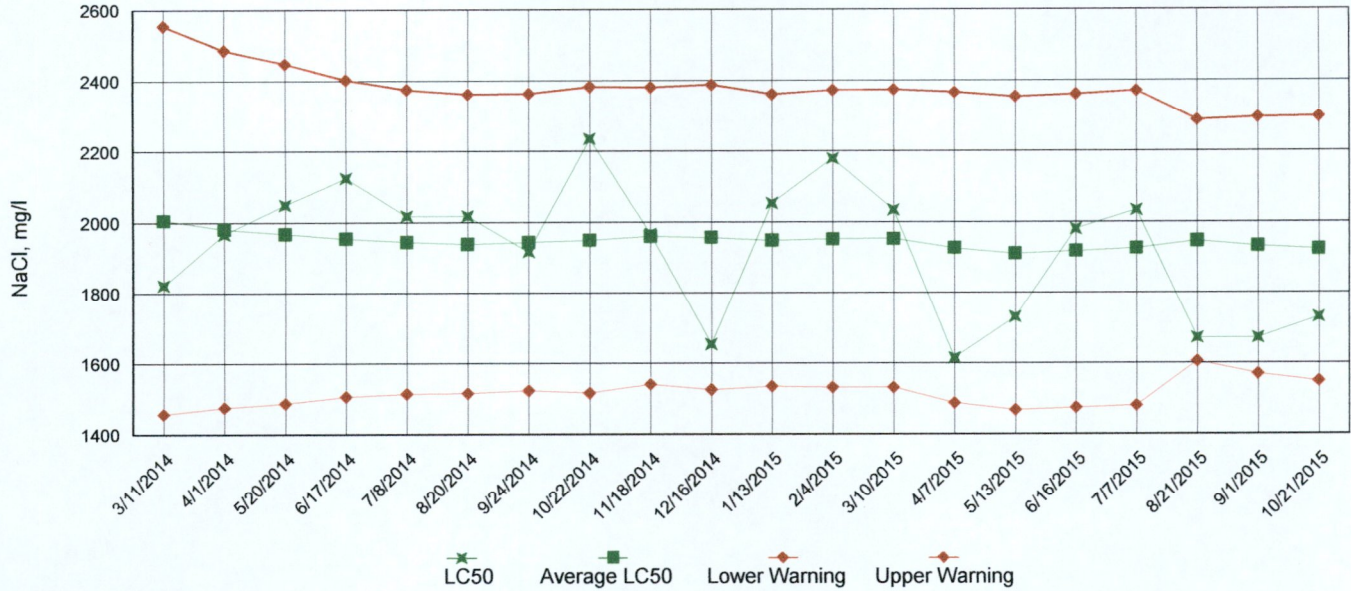
IC25 Growth Data



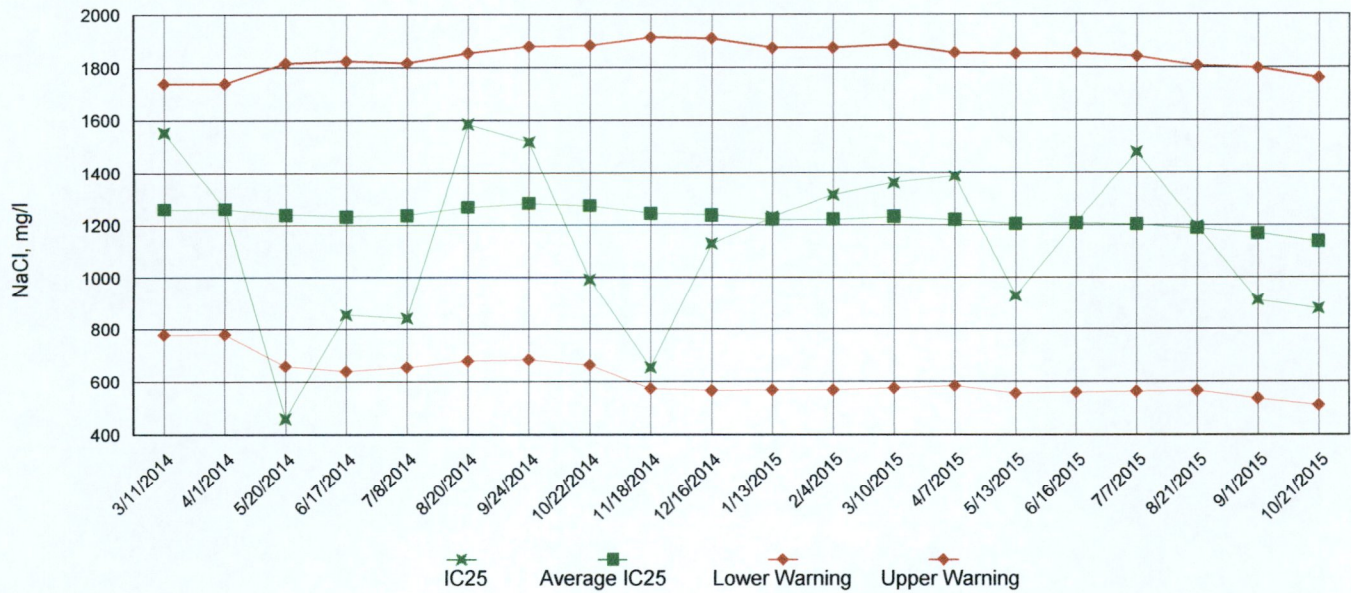
Appendix A4: Test 1002.0

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 27, 2015 at 1820

Date and Time Test Terminated: November 3, 2015 at 1620

Dilution water used: Synthetic Moderately Hard Water #4261

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	87.5	100	100	100	97.5	5.73
32 %	100	100	100	100	87.5	100	100	97.5	5.73
42 %	100	87.5	100	75.0	87.5	100	97.5	90.0	11.6
56 %	75.0	100	75.0	87.5	75.0	100	95.0	82.5	13.6
75 %	87.5	75.0	100	87.5	75.0	100	92.5	85.0	12.3
100 %	100	100	87.5	87.5	87.5	100	97.5	92.5	7.40

DATA TABLE FOR GROWTH

Effluent Conc. %	Average dry weight, mg replicate chambers					Mean dry weight, mg	CV%
	A	B	C	D	E		
Control	0.446	0.466	0.465	0.468	0.454	0.46	2.05
32 %	0.505	0.420	0.490	0.520	0.484	0.484	7.92
42 %	0.412	0.494	0.521	0.391	0.460	0.456	11.9
56 %	0.365	0.392	0.340	0.414	0.401	0.382	7.78
75 %	0.366	0.415	0.470	0.440	0.418	0.422	9.05
100 %	0.355	0.380	0.446	0.418	0.464	0.413	11.0

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. Dunnett's 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 %)	<u> </u> YES	<u> X </u> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<u> </u> YES	<u> </u> 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 %)	<u> </u> YES	<u> X </u> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<u> </u> YES	<u> </u> 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: 56 % (TXP6C)
- 7. NOEC *Pimephales* Sublethality: 100 % (TPP6C)
- 8. LOEC *Pimephales* Sublethality: 56 % (TYP6C)
- 9. Coefficient of variation for *Pimephales* growth: 11 (TQP6C)

Appendix B: Test 1000.0

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

PERMITTEE: Huntsville Water Utilities
NPDES NO.: AR0022004 AFIN# 44-00018
CONTACT: Mr. Bill Eoff
ANALYST: 280, 304, 310, 314

SAMPLE No. 1 COLLECTED ending: DATE: October 26, 2015 TIME: 0500
SAMPLE No. 2 COLLECTED ending: DATE: October 28, 2015 TIME: 0500
SAMPLE No. 3 COLLECTED ending: DATE: October 30, 2015 TIME: 0500
Test Initiated: DATE: October 27, 2015 TIME: 1820
Test Terminated: DATE: November 3, 2015 TIME: 1620

DILUTION Control	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.2	7.7	7.7	7.3	7.8	7.8	7.3
Final	7.0	6.8	6.6	6.5	8.5	7.3	5.9
pH Initial	7.9	7.9	7.8	7.9	7.8	7.6	7.7
Final	8.0	7.4	7.5	7.7	7.6	7.8	7.3
Alkalinity	60	NA	57	NA	57	NA	NA
Hardness	81	NA	81	NA	81	NA	NA
Conductivity	280	280	320	320	230	240	270
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 32 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.5	7.5	7.3	7.7	7.7	8.0	7.0
Final	7.3	6.7	6.8	6.6	8.3	7.1	6.2
pH Initial	7.8	7.9	7.6	7.8	7.8	7.8	7.7
Final	7.9	7.4	7.6	7.8	7.8	7.9	7.6
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	480	490	500	510	460	470	510
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 42 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.6	7.5	7.7	7.4	7.7	7.6	7.2
Final	7.2	6.7	7.0	6.5	8.1	7.1	6.1
pH Initial	7.8	7.8	7.6	7.8	7.7	7.8	7.7
Final	7.8	7.4	7.6	7.8	7.8	7.9	7.6
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	490	500	560	570	520	540	570
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 56 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.7	7.4	7.2	7.0	7.8	7.7	7.4
Final	7.1	6.6	6.9	6.4	8.0	7.0	6.2
pH Initial	7.7	7.8	7.6	8.0	7.6	7.8	7.6
Final	7.8	7.4	7.6	7.8	7.8	7.9	7.5
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	630	640	650	670	580	600	630
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 75 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.6	7.3	7.5	7.6	7.6	7.9	7.2
Final	7.1	6.5	7.0	6.4	7.9	7.3	6.4
pH Initial	7.6	7.7	7.4	7.8	7.5	7.8	7.6
Final	7.8	7.4	7.6	7.8	7.8	8.0	7.6
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	750	760	770	780	710	730	750
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 100 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.5	7.2	7.7	7.7	7.6	7.8	6.9
Final	7.3	6.5	7.1	6.1	7.8	7.2	6.1
pH Initial	7.5	7.6	7.4	7.9	7.5	7.8	7.5
Final	7.8	7.4	7.6	7.9	7.8	8.0	7.6
Alkalinity	66	NA	120	NA	64	NA	NA
Hardness	170	NA	170	NA	170	NA	NA
Conductivity	910	920	920	940	880	900	920
Chlorine	0.10	NA	0.10	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 27, 2015 at 1440

Date and Time Test Terminated: November 2, 2015 at 1305

Dilution water used: Synthetic Moderately Hard Water #4261

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	100	100	100	100	100	100

NUMBER OF YOUNG PRODUCED PER FEMALE @ 6 DAYS

Replicates	Control	Percent Effluent				
		32 %	42 %	56 %	75 %	100 %
A	14	30	30	26	32	32
B	23	27	27	18	20	36
C	15	33	26	20	26	28
D	23	25	26	23	28	31
E	17	28	24	23	27	28
F	24	26	22	25	31	32
G	9	21	21	21	24	16
H	20	21	26	18	29	21
I	26	30	25	24	26	29
J	21	23	19	26	27	19
Mean per Adult	19.2	26.4	24.6	22.4	27.0	27.2
Mean per Surviving Adult	19.2	26.4	24.6	22.4	27.0	27.2
CV %	27.8	15.2	13.0	13.5	12.7	23.7

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 %)	<u> </u> YES	<u> X </u> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<u> </u> YES	<u> </u> 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 %)	<u> </u> YES	<u> X </u> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<u> </u> YES	<u> </u> 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: 27.8 (TQP3B)

Appendix B: Test 1002.0

CHRONIC TOXICITY SUMMARY FORM
Ceriodaphnia dubia
CHEMICAL PARAMETERS CHART

PERMITTEE: Huntsville Water Utilities
NPDES NO.: AR0022004 AFIN# 44-00018
CONTACT: Mr. Bill Eoff
ANALYST: 280, 304, 310, 314

SAMPLE No. 1 COLLECTED ending: DATE: October 26, 2015 TIME: 0500
SAMPLE No. 2 COLLECTED ending: DATE: October 28, 2015 TIME: 0500
SAMPLE No. 3 COLLECTED ending: DATE: October 30, 2015 TIME: 0500
Test Initiated: DATE: October 27, 2015 TIME: 1440
Test Terminated: DATE: November 2, 2015 TIME: 1305

DILUTION Control	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.2	7.7	7.7	7.3	7.8	7.8	7.3
Final	7.8	7.6	7.7	8.0	7.5	7.7	—
pH Initial	7.9	7.9	7.8	7.9	7.8	7.6	7.7
Final	8.2	7.9	8.2	8.4	8.0	8.1	—
Alkalinity	60	NA	57	NA	57	NA	NA
Hardness	81	NA	81	NA	81	NA	NA
Conductivity	280	280	320	320	230	240	270
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 32 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.5	7.5	7.3	7.7	7.7	8.0	7.0
Final	7.8	7.4	7.4	7.9	7.6	7.9	—
pH Initial	7.8	7.9	7.6	7.8	7.8	7.8	7.7
Final	8.2	7.9	8.2	8.4	8.2	8.2	—
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	480	490	500	510	460	470	510
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 42 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.6	7.5	7.7	7.4	7.7	7.6	7.2
Final	7.6	7.6	7.5	7.8	7.6	7.8	—
pH Initial	7.8	7.8	7.6	7.8	7.7	7.8	7.7
Final	8.2	8.0	8.2	8.5	8.2	8.2	—
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	490	500	560	570	520	540	570
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 56 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.7	7.4	7.2	7.0	7.8	7.7	7.4
Final	7.6	7.2	7.5	7.8	7.7	7.7	—
pH Initial	7.7	7.8	7.6	8.0	7.6	7.8	7.6
Final	8.2	7.9	8.1	8.5	8.1	8.2	—
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	630	640	650	670	580	600	630
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 75 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.6	7.3	7.5	7.6	7.6	7.9	7.2
Final	7.7	7.5	7.4	7.7	7.5	7.5	—
pH Initial	7.6	7.7	7.4	7.8	7.5	7.8	7.6
Final	8.2	7.9	8.2	8.5	8.1	8.2	—
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	750	760	770	780	710	730	750
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 100 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.5	7.2	7.7	7.7	7.6	7.8	6.9
Final	7.5	7.3	7.5	7.7	7.5	7.5	—
pH Initial	7.5	7.6	7.4	7.9	7.5	7.8	7.5
Final	8.2	8.0	8.2	8.5	8.2	8.2	—
Alkalinity	66	NA	120	NA	64	NA	NA
Hardness	170	NA	170	NA	170	NA	NA
Conductivity	910	920	920	940	880	900	920
Chlorine	0.10	NA	0.10	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 1 OF 3

Client: <u>Huntsville Water Utilities</u>			PO No.		NO OF BOTTLES	ANALYSES REQUESTED										AIC CONTROL NO: <u>195561</u>					
Project Reference: <u>Bio Monitoring</u>			SAMPLE MATRIX			Cd & Pb Chronic															
Project Manager: <u>Bill Eoff</u>			WATER	SOIL	BOTTLES		Cd & Pb Chronic														
Sampled By: <u>Bill Eoff</u>						GRAB		COMPOSITE	BOTTLES	Cd & Pb Chronic											
AIC No.	Sample Identification	Date/Time Collected																			
	<u>Huntsville#1</u>	<u>10/25/15 @ 7:00</u> <u>10/26/15 @ 5:00</u>		<u>X</u>		<u>X</u>															
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 Date/Time Received Date/Time
 By: R. M. [Signature] 10/26/15 @ 8:00 By: _____
 Relinquished Date/Time Received in Lab Date/Time
 By: _____ By: D. [Signature] 10-27-15
0930
 Comments: 8019 408A 0180

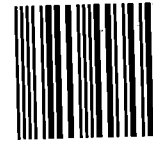
Huntsville WATER Utilities

P.O. Box 430

Huntsville, AR 72740



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WATER DIVISION

5301 Northshore Drive

North Little Rock, AR 72118

