



March 13, 2015  
Control No. 187831-1  
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March 13, 2015

Test Results of  
First Quarter  
Chronic 7-Day Renewal  
Biomonitoring Testing  
for  
Outfall 001  
City of Hot Springs

Control No. 187831-1

Prepared for:

Mr. James Sorrells  
City of Hot Springs  
320 Davidson Drive  
Hot Springs, AR 71901

Prepared by:

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City of Hot Springs  
ATTN: Mr. James Sorrells  
320 Davidson Drive  
Hot Springs, AR 71901

Re: Chronic 7-Day Renewal utilizing *Pimephales promelas* (Fathead minnow) and *Ceriodaphnia dubia*  
Outfall 001 - City of Hot Springs  
NPDES Permit No. AR0033880 AFIN#26-00145

Dear Mr. James Sorrells:

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:

**Chronic *Pimephales promelas* Survival and Growth Test:** Due to pathogen interference, the test will need to be repeated. It is recommended that a side by side treated and untreated test be performed to confirm pathogen interference. Ms. Mary Barnett at ADEQ reviewed and confirmed this information. The data is enclosed for your review.

**Method 1002.0 Chronic *Ceriodaphnia dubia* Survival and Reproduction Test:** The No Observable Effects Concentration (NOEC) for survival occurred at 87 % effluent, which is above the critical dilution of 65 %. Any statistical difference with sublethal effects cannot be considered toxic due to the minimum significant difference (PMSD) calculated result being below the lower PMSD bounds. **The sample, therefore PASSED both lethal and sub-lethal effects for the *Ceriodaphnia dubia* test.**

AMERICAN INTERPLEX CORPORATION

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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	0.386	PASS
Control Growth CV < or = 40%	27.3	PASS
Growth Minimum Significant Difference 12 to 30%	32.0	FAIL
Critical Dilution CV < or = 40%	28.9	PASS

*Ceriodaphnia dubia* Method 1002.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	100	PASS
Control Reproduction > or = 15 per Surviving Female	30.2	PASS
Control CV < or = 40% per Surviving Female	7.93	PASS
Reproduction Minimum Significant Difference 13 to 47%	8.14	BELOW
Critical Dilution CV < or = 40%	6.29	PASS

II. Outlined Report

A. Introduction

1. Permit Number: AR0033880 AFIN#26-00145
2. Test Requirements: Chronic Biomonitoring, Quarterly  
Test Methods 1000.0 and 1002.0
3. Receiving Stream: Lake Catherine

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)	9.0	8.7	8.8
pH (standard units)	7.2	7.3	7.2
Alkalinity (mg/l as CaCO <sub>3</sub> )	37	64	55
Hardness (mg/l as CaCO <sub>3</sub> )	71	87	88
Conductivity (umhos/cm)	160	230	250
Residual Chlorine (mg/l)	<0.05	<0.05	<0.05
Ammonia as N (mg/l)	<0.1	<0.1	<0.1

2. Dilution Water Samples: Synthetic Soft Water #4187

- a. Dates Prepared: February 13 through February 27, 2015
- b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	8.2	7.8	8.0
pH (standard units)	7.6	7.3	7.3
Alkalinity (mg/l as CaCO <sub>3</sub> )	31	32	32
Hardness (mg/l as CaCO <sub>3</sub> )	44	44	44
Conductivity (umhos/cm)	120	140	130
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: February 24, 2015 at 1145  
Date & Time Test Terminated: March 3, 2015 at 1215  
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: February 24, 2015 at 1150  
Date & Time Test Terminated: March 2, 2015 at 1315  
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 February 4, 2015 at 1425 to February 11, 2015 at 1310

The results were as follows: (Control No. 187315-1.)

Survival LC-50: 4540 mg/l

Growth IC-25: 3331 mg/l

Growth PMSD: 16.3

*Ceriodaphnia dubia*

Chronic reference tests are performed monthly.

A chronic reference test was performed on February 4, 2015 at 1530 to February 10, 2015 at 1530

The results were as follows: (Control No. 187315-2.)

Survival LC-50: 2180 mg/l

Growth IC-25: 1316 mg/l

Growth PMSD: 23.4

V. Chemical Analysis/Quality Control

Parameter	Method	% Recovery	Relative % Difference
Alkalinity	SM 2320 B	NA	0.00
Hardness	EPA 200.7	101	1.05
pH	SM 4500-H+ B	100	0.940
Conductivity	EPA 120.1	101	1.35

VI. Organism History

*Pimephales promelas* (Fathead minnow)

Date: February 24, 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: February 24, 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

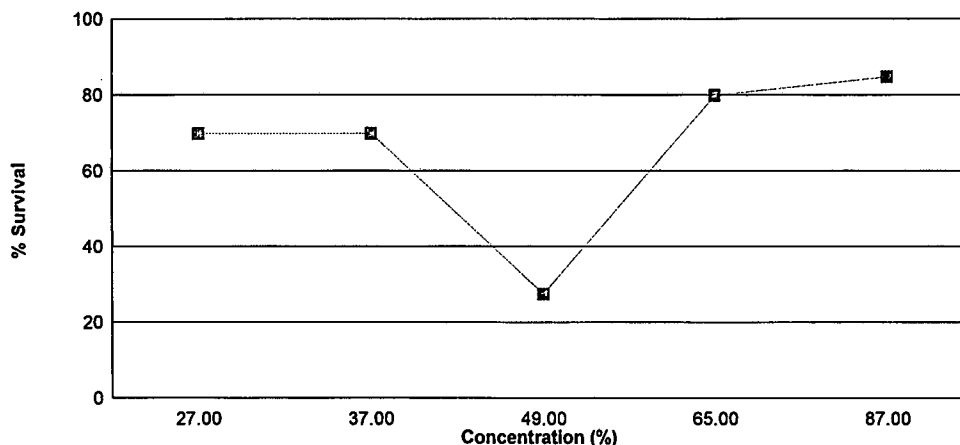
Larvae are exposed in a static renewal system for seven days to different concentrations of effluent with dilution water. Test results are based on the survival and growth (increase in weight) of the larvae.

Effluent dilutions for this test were 27 %, 37 %, 49 %, 65 %, 87 % in accordance with the NPDES permit.

The low flow or 'critical' dilution is specified in the NPDES permit as 65 % effluent.

The test was initiated on February 24, 2015 at 1145 and continued through March 3, 2015 at 1215. Statistical analyses were performed on the observed data and the no observable effects concentrations (NOECs) were as follows:

- a.) NOEC survival = 87 % effluent
- b.) NOEC growth = 87 % effluent



Summary of the 7-day Fathead Minnow Survival and Growth		
Concentration	Percent Survival	Mean Growth (mg)
Control	97.5	0.376
27 %	70.0	0.312
37 %	70.0	0.315
49 %	27.5 *	0.195 *
65 %	80.0	0.308
87 %	85.0	0.326

\*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

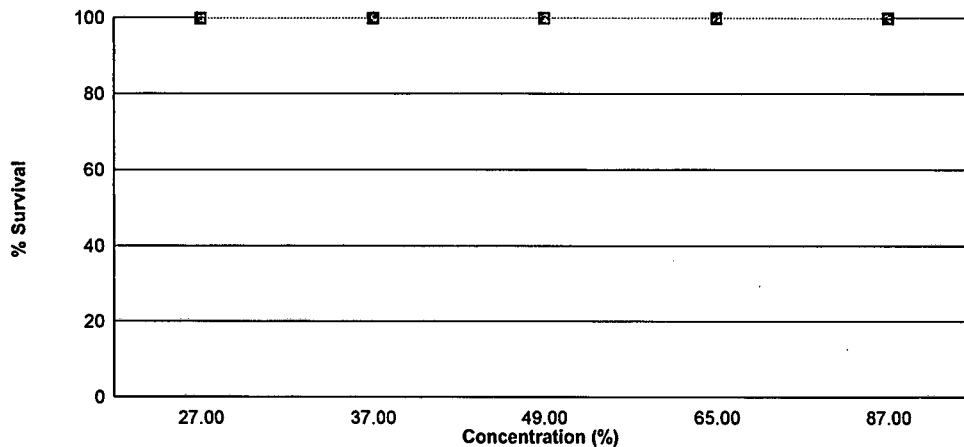
Neonates are exposed in a static renewal system to different concentrations of effluent with dilution water until 60% of surviving control organisms have three broods of offspring with an average of at least 15 young per female.

Effluent dilutions for this test were 27 %, 37 %, 49 %, 65 %, 87 % in accordance with the NPDES permit.

The low flow or 'critical' dilution is specified in the NPDES permit as 65 % effluent.

The test was initiated on February 24, 2015 at 1150 and continued through March 2, 2015 at 1315. Statistical analyses were performed on the observed data and the no observable effects concentrations (NOECs) were as follows:

- a.) NOEC survival = 87 % effluent
- b.) NOEC reproduction = 87 % effluent



Summary of the 6-day <i>Ceriodaphnia dubia</i> Survival and Reproduction Data		
Concentration	Percent Survival	Mean Reproduction
Control	100	30.2
27 %	100	29.1
37 %	100	30.9
49 %	100	30.5
65 %	100	30.0
87 %	100	32.2



Appendix A1: Test 1000.0

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

Date and Time Test Initiated: February 24, 2015 at 1145

Date and Time Test Terminated: March 3, 2015 at 1215

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	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
27 %	A	8	8	8	2	2	2	2
	B	8	8	8	7	6	6	6
	C	8	8	8	6	6	5	5
	D	7	7	7	7	7	7	7
	E	8	8	8	8	8	8	8
37 %	A	8	8	8	3	3	3	3
	B	8	8	8	8	8	8	8
	C	8	8	8	2	2	2	2
	D	7	7	7	7	7	7	7
	E	8	8	8	8	8	8	8
49 %	A	8	8	8	3	3	1	1
	B	8	8	8	2	1	1	1
	C	8	8	8	4	4	4	4
	D	8	8	8	3	3	2	2
	E	8	8	8	5	3	3	3
65 %	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	8	7
	C	8	8	8	8	8	7	6
	D	8	8	8	6	5	4	3
	E	8	8	8	8	8	8	8
87 %	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	2	2	2	2

Appendix A1: Test 1000.0

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

Test Initiated: February 24, 2015 at 1145  
Test Terminated: March 3, 2015 at 1215

Drying Started: March 2, 2015 at 1150  
Drying Ended: March 4, 2015 at 1030

Concentration	Replicate	Weight of pan	Weight of pan + fish	Total weight of fish (g)	Original # of fish	Mean dry weight (mg)
Control	A	.93652	.93854	0.00202	8	0.252
	B	.93516	.93794	0.00278	8	0.348
	C	.93608	.93866	0.00258	8	0.322
	D	.94100	.94462	0.00362	8	0.452
	E	.94263	.94669	0.00406	8	0.508
27 %	A	.94093	.94235	0.00142	8	0.178
	B	.94024	.94278	0.00254	8	0.318
	C	.93981	.94216	0.00235	8	0.294
	D	.93837	.94124	0.00287	8	0.359
	E	.94251	.94578	0.00327	8	0.409
37 %	A	.94269	.94438	0.00169	8	0.211
	B	.94579	.94872	0.00293	8	0.366
	C	.94747	.94957	0.00210	8	0.262
	D	.95132	.95439	0.00307	8	0.384
	E	.95055	.95338	0.00283	8	0.354
49 %	A	.94431	.94572	0.00141	8	0.176
	B	.94282	.94414	0.00132	8	0.165
	C	.93892	.94057	0.00165	8	0.206
	D	.93615	.93760	0.00145	8	0.181
	E	.93638	.93836	0.00198	8	0.248
65 %	A	.93764	.94063	0.00299	8	0.374
	B	.93632	.93915	0.00283	8	0.354
	C	.93900	.94063	0.00163	8	0.204
	D	.93853	.94029	0.00176	8	0.220
	E	.93417	.93729	0.00312	8	0.390
87 %	A	.93525	.93830	0.00305	8	0.381
	B	.93621	.93925	0.00304	8	0.380
	C	.93606	.93866	0.00260	8	0.325
	D	.94272	.94557	0.00285	8	0.356
	E	.94241	.94392	0.00151	8	0.189

Appendix A1: Test 1002.0

*Ceriodaphnia dubia* Survival and Reproduction

Date and Time Test Initiated: February 24, 2015 at 1150

Date and Time Test Terminated: March 2, 2015 at 1315

Concentration: Control													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	4	4	4	6	4	4	5	4	4	0	39	10	3.90
4	0	0	0	11	0	0	0	0	0	5	16	10	1.60
5	13	15	12	0	11	10	10	13	11	10	105	10	10.5
6	15	15	16	16	14	14	13	13	12	14	142	10	14.2
7													
8													
TOTAL	32	34	32	33	29	28	28	30	27	29	302	10	30.2

Concentration: 27 %													
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	4	4	4	4	0	3	33	10	3.30
4	0	0	0	0	0	0	0	0	4	0	4	10	0.400
5	11	12	12	11	11	10	12	13	11	12	115	10	11.5
6	13	14	16	13	12	14	15	14	13	15	139	10	13.9
7													
8													
TOTAL	27	30	32	27	27	28	31	31	28	30	291	10	29.1

Concentration: 37 %													
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	5	0	4	4	0	3	4	4	4	32	10	3.20
4	0	0	8	0	0	7	0	0	0	0	15	10	1.50
5	13	12	10	13	10	14	12	11	11	12	118	10	11.8
6	14	15	12	16	17	14	16	12	13	15	144	10	14.4
7													
8													
TOTAL	31	32	30	33	31	35	31	27	28	31	309	10	30.9

Appendix A1: Test 1002.0

*Ceriodaphnia dubia* Survival and Reproduction

Date and Time Test Initiated: February 24, 2015 at 1150

Date and Time Test Terminated: March 2, 2015 at 1315

Concentration: 49 %														
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	4	5	4	3	4	6	4	0	4	38	10	3.80	
4	0	0	0	0	0	0	0	0	3	0	3	10	0.300	
5	12	14	12	10	13	10	11	11	12	11	116	10	11.6	
6	16	17	15	18	16	13	12	13	14	14	148	10	14.8	
7														
8														
TOTAL	32	35	32	32	32	27	29	28	29	29	305	10	30.5	

Concentration: 65 %													
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	4	4	4	4	0	0	4	4	0	28	10	2.80
4	0	0	0	0	0	6	2	0	0	2	10	10	1.00
5	10	13	11	11	12	10	10	11	12	12	112	10	11.2
6	16	15	15	14	17	13	15	15	16	14	150	10	15.0
7													
8													
TOTAL	30	32	30	29	33	29	27	30	32	28	300	10	30.0

Concentration: 87 %													
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	3	4	0	4	0	4	32	10	3.20
4	0	0	0	0	0	0	3	0	5	0	8	10	0.800
5	10	11	12	13	14	11	12	12	12	12	119	10	11.9
6	14	17	18	19	18	12	15	17	13	20	163	10	16.3
7													
8													
TOTAL	29	32	34	36	35	27	30	33	30	36	322	10	32.2

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	0.87500	1.20940
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	27 %	1	0.25000	0.52360
2	27 %	2	0.75000	1.04720
2	27 %	3	0.62500	0.91174
2	27 %	4	0.87500	1.20940
2	27 %	5	1.00000	1.39310
3	37 %	1	0.37500	0.65906
3	37 %	2	1.00000	1.39310
3	37 %	3	0.25000	0.52360
3	37 %	4	0.87500	1.20940
3	37 %	5	1.00000	1.39310
4	49 %	1	0.12500	0.36137
4	49 %	2	0.12500	0.36137
4	49 %	3	0.50000	0.78540
4	49 %	4	0.25000	0.52360
4	49 %	5	0.37500	0.65906
5	65 %	1	1.00000	1.39310
5	65 %	2	0.87500	1.20940
5	65 %	3	0.75000	1.04720
5	65 %	4	0.37500	0.65906
5	65 %	5	1.00000	1.39310
6	87 %	1	1.00000	1.39310
6	87 %	2	1.00000	1.39310
6	87 %	3	1.00000	1.39310
6	87 %	4	1.00000	1.39310
6	87 %	5	0.25000	0.52360

Appendix A2: Statistics

*Pimephales promelas* (Fathead minnow) Survival

Shapiro - Wilk's Test for Normality		Transform: Arc Sin(Square Root(Y))
D = 2.267		
W = 0.9097		
Critical W = 0.9	(alpha = 0.01, N = 30)	
Critical W = 0.927	(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 = 8.912		
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	1.97	0.394	4.173
Within (Error)	24	2.266	0.09442	
Total	29	4.236		
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				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	27 %	1.017	0.7	1.746	
3	37 %	1.0357	0.7	1.65	
4	49 %	0.53816	0.275	4.21	*
5	65 %	1.1404	0.8	1.111	
6	87 %	1.2192	0.85	0.706	
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	27 %	5	0.3433	36	0.275
3	37 %	5	0.3433	36	0.275
4	49 %	5	0.3433	36	0.7
5	65 %	5	0.3433	36	0.175
6	87 %	5	0.3433	36	0.125

Appendix A2: Statistics

*Pimephales promelas* (Fathead minnow) Growth

Shapiro - Wilk's Test for Normality	No Transformation
<p>D = 0.1565 W = 0.9444 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 = 4.119 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	0.08883	0.01777	2.725	
Within (Error)	24	0.1565	0.006521		
Total	29	0.2453			
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	0.3764	0.3764			
2	27 %	0.3116	0.3116	1.269		
3	37 %	0.3154	0.3154	1.194		
4	49 %	0.1952	0.1952	3.548	*	
5	65 %	0.3084	0.3084	1.331		
6	87 %	0.3262	0.3262	0.9829		
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	27 %	5	0.1205	32	0.0648		
3	37 %	5	0.1205	32	0.061		
4	49 %	5	0.1205	32	0.1812		
5	65 %	5	0.1205	32	0.068		
6	87 %	5	0.1205	32	0.0502		

Appendix A2: Statistics

*Ceriodaphnia dubia* Survival

Fisher's Exact Test			
Identification	Alive	Dead	Total Animals
Control	10	0	10
27 %	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
37 %	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
49 %	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
65 %	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
87 %	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	27 %	10	0	
2	37 %	10	0	
3	49 %	10	0	
4	65 %	10	0	
5	87 %	10	0	

Appendix A2: Statistics

*Ceriodaphnia dubia* Reproduction

Kolmogorov Test for Normality	No Transformation
D = 0.0954 D* = 0.7485 Critical D* = 1.035 (alpha = 0.01, N = 60)	
Data PASS normality test (alpha = 0.01).	

Bartlett's Test for Homogeneity of Variance	No Transformation
Calculated B1 statistic = 3.101 Critical B = 15.086 (alpha = 0.01, df = 5)	
Data PASS B1 homogeneity test at 0.01 level.	

Appendix A2: Statistics

*Ceriodaphnia dubia* Reproduction

ANOVA Table				No Transformation	
SOURCE	DF	SS	MS	F	
Between	5	53.48	10.7	1.891	
Within (Error)	54	305.5	5.657		
Total	59	359			
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	30.2	30.2			
2	27 %	29.1	29.1	1.034		
3	37 %	30.9	30.9	-0.6581		
4	49 %	30.5	30.5	-0.282		
5	65 %	30	30	0.188		
6	87 %	32.2	32.2	-1.88		
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	27 %	10	2.457	8.14	1.1	
3	37 %	10	2.457	8.14	-0.7	
4	49 %	10	2.457	8.14	-0.3	
5	65 %	10	2.457	8.14	0.2	
6	87 %	10	2.457	8.14	-2	

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: February 24, 2015 at 1011

Date and Time Test Terminated: March 3, 2015 at 1215

Effluent Conc.: Control		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.2	8.0	7.8	8.4	8.0	7.8	8.4
	Final *1	7.7	7.6	6.9	8.5	8.1	8.0	7.3
	Final *2	8.1	8.0	8.1	8.6	8.4	8.1	
pH, units	Initial	7.6	7.4	7.3	7.0	7.3	7.0	7.2
	Final *1	7.4	7.4	7.1	6.9	7.6	7.0	7.3
	Final *2	7.4	7.5	7.3	7.2	7.1	7.3	
Alkalinity, mg CaCO <sub>3</sub> /l		31	NA	32	NA	32	NA	NA
Hardness, mg CaCO <sub>3</sub> /l		44	NA	44	NA	44	NA	NA
Conductivity, umhos/cm		120	140	140	140	130	130	170
Res. Chlorine, mg/l		<0.05	NA	<0.05	NA	<0.05	NA	NA

Effluent Conc.: 27 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.6	7.9	8.3	8.3	8.4	7.8	8.4
	Final *1	7.8	7.6	7.6	8.1	8.1	8.0	7.9
	Final *2	8.1	8.0	8.2	8.5	8.4	8.1	
pH, units	Initial	7.4	7.3	7.3	7.1	7.2	7.1	7.2
	Final *1	7.4	7.3	7.2	7.0	7.6	7.1	7.5
	Final *2	7.4	7.6	7.4	7.4	7.2	7.5	

Effluent Conc.: 37 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.4	8.0	8.4	8.5	8.7	8.0	8.3
	Final *1	7.7	7.5	7.2	8.0	8.0	8.3	8.1
	Final *2	8.2	8.0	8.2	8.5	8.5	8.2	
pH, units	Initial	7.4	7.3	7.3	7.1	7.2	7.2	7.3
	Final *1	7.4	7.4	7.0	6.9	7.7	7.2	7.6
	Final *2	7.5	7.6	7.5	7.5	7.3	7.5	

Appendix A3: Water Chemistry  
Routine Chemical and Physical Data

Date and Time Test Initiated: February 24, 2015 at 1011  
Date and Time Test Terminated: March 3, 2015 at 1215

Effluent Conc.: 49 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.5	8.2	8.1	8.4	8.3	7.9	8.2
	Final *1	7.8	7.3	7.7	7.6	7.8	7.9	8.0
	Final *2	8.0	7.9	8.1	8.5	8.3	8.1	
pH, units	Initial	7.4	7.3	7.3	7.2	7.2	7.2	7.3
	Final *1	7.5	7.3	7.2	7.1	7.7	7.3	7.6
	Final *2	7.5	7.6	7.6	7.5	7.3	7.6	

Effluent Conc.: 65 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.3	7.9	8.2	8.4	8.6	7.8	8.2
	Final *1	7.6	7.1	7.4	7.9	7.8	8.2	7.8
	Final *2	8.4	7.7	8.0	8.1	8.4	8.1	
pH, units	Initial	7.3	7.3	7.3	7.2	7.2	7.4	7.6
	Final *1	7.5	7.4	7.1	7.2	7.7	7.3	7.6
	Final *2	7.5	7.6	7.6	7.5	7.3	7.6	
Alkalinity, mg CaCO <sub>3</sub> /l		35	NA	55	NA	53	NA	NA
Hardness, mg CaCO <sub>3</sub> /l		64	NA	73	NA	73	NA	NA
Conductivity, umhos/cm		150	170	200	200	200	200	260
Res. Chlorine, mg/l		<0.05	NA	<0.05	NA	<0.05	NA	NA

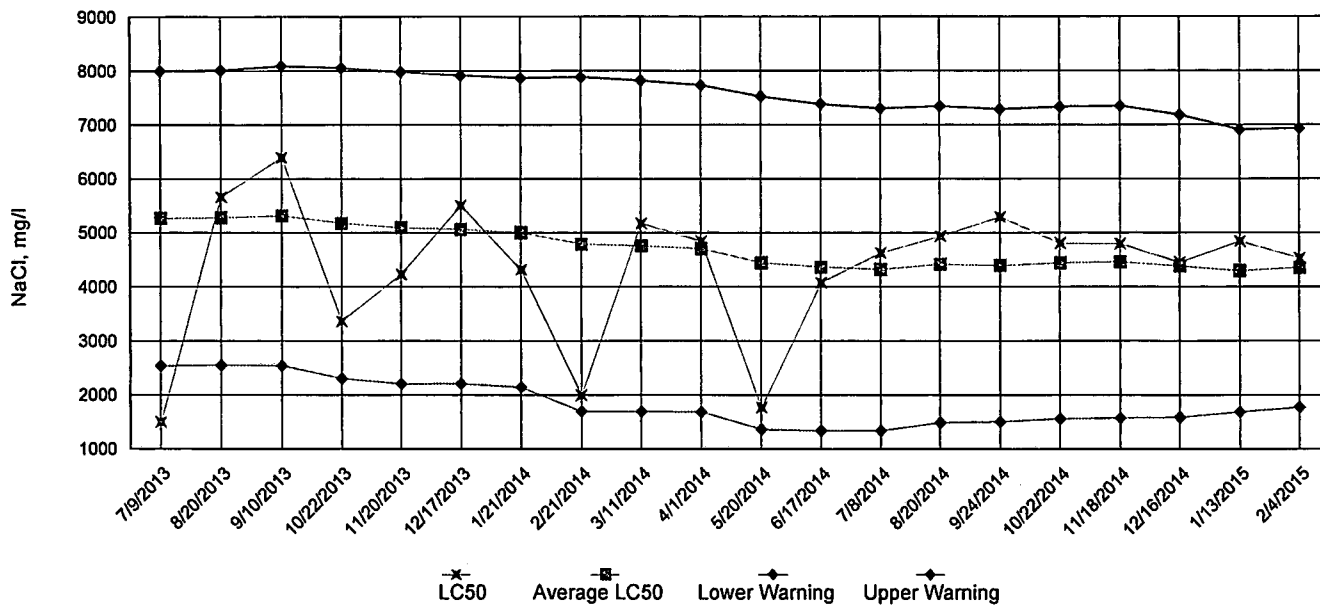
Effluent Conc.: 87 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.9	8.0	8.6	8.3	8.9	8.0	8.4
	Final *1	7.5	7.3	7.6	7.7	8.0	8.0	8.2
	Final *2	8.4	8.1	7.9	8.5	8.4	8.2	
pH, units	Initial	7.2	7.2	7.3	7.1	7.1	7.4	7.6
	Final *1	7.5	7.4	7.2	7.2	7.8	7.4	7.7
	Final *2	7.5	7.7	7.7	7.6	7.4	7.7	

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

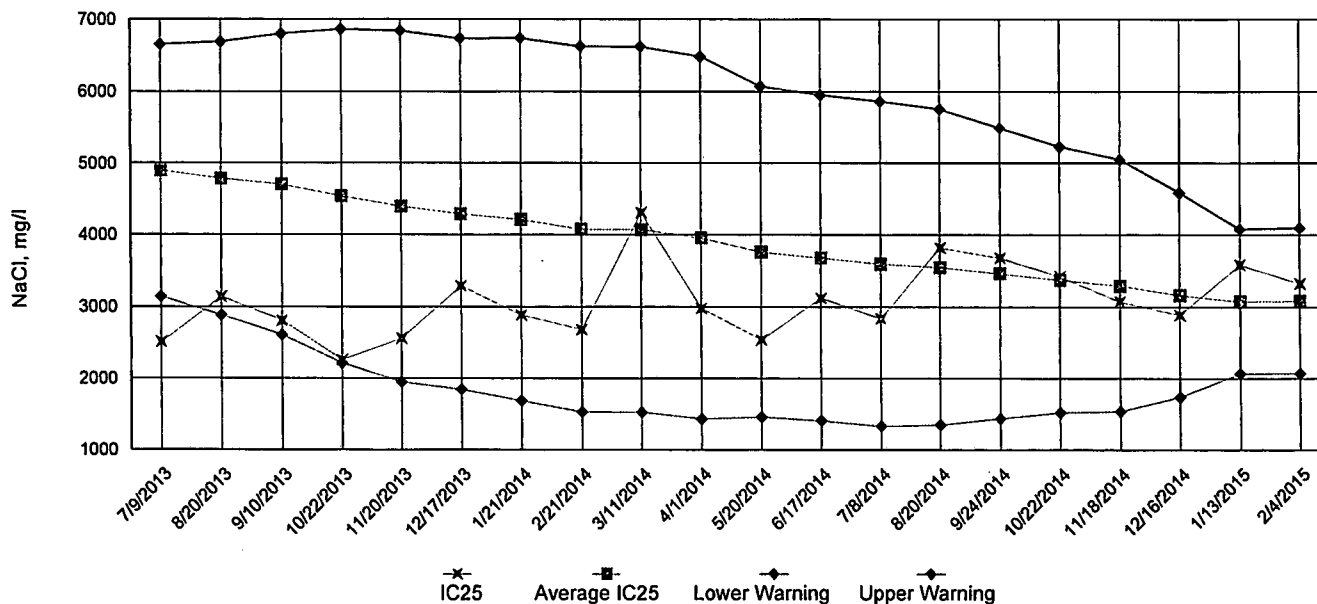
Appendix A4: Test 1000.0

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

LC50 Survival Data



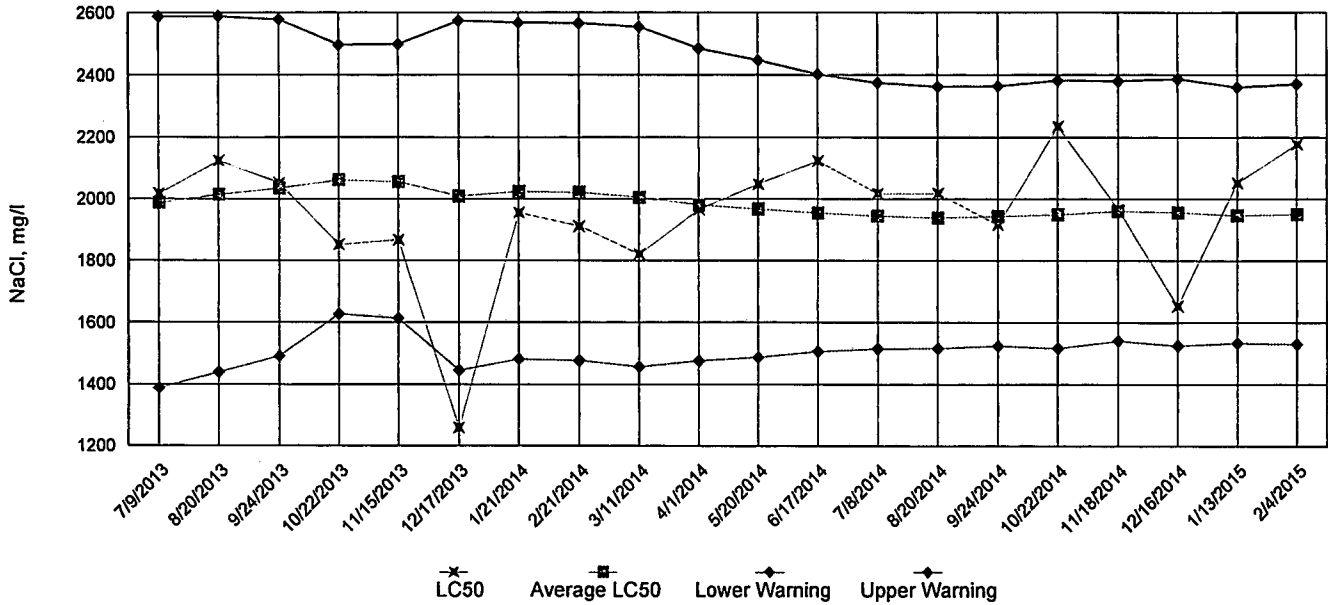
IC25 Growth Data



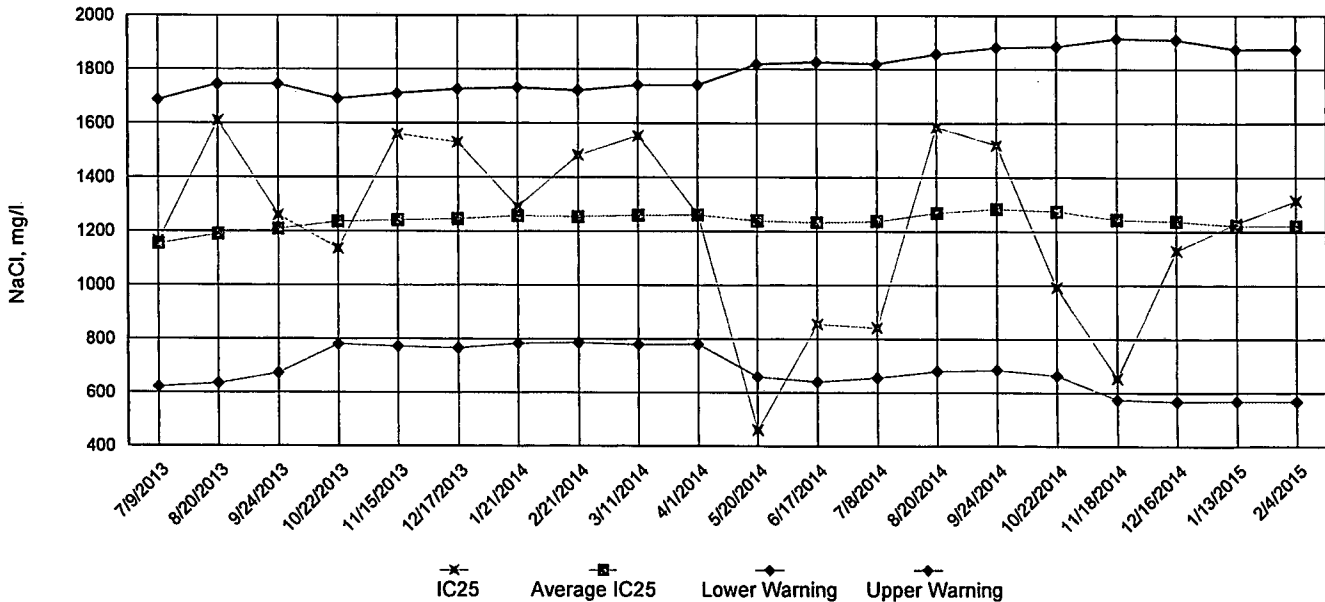


Appendix A4: Test 1002.0  
Chronic Reference Toxicant, *Ceriodaphnia dubia*

LC50 Survival Data



IC25 Reproduction Data



Appendix B: Test 1000.0

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

Permittee: City of Hot Springs

NPDES No.: AR0033880 AFIN#26-00145

Date and Time Test Initiated: February 24, 2015 at 1145

Date and Time Test Terminated: March 3, 2015 at 1215

Dilution water used: Synthetic Soft Water #4187

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	87.5	100	100	100	100	100	100	97.5	5.73
27 %	25.0	75.0	62.5	87.5	100	97.5	97.5	70.0	41.1
37 %	37.5	100	25.0	87.5	100	97.5	97.5	70.0	51.4
49 %	12.5	12.5	50.0	25.0	37.5	100	100	27.5	59.3
65 %	100	87.5	75.0	37.5	100	100	100	80.0	32.4
87 %	100	100	100	100	25.0	100	100	85.0	39.5

DATA TABLE FOR GROWTH

Effluent Conc. %	Average dry weight, mg replicate chambers					Mean dry weight, mg	CV%
	A	B	C	D	E		
Control	0.252	0.348	0.322	0.452	0.508	0.376	27.3
27 %	0.178	0.318	0.294	0.359	0.409	0.312	27.8
37 %	0.211	0.366	0.262	0.384	0.354	0.315	23.8
49 %	0.176	0.165	0.206	0.181	0.248	0.195	17.0
65 %	0.374	0.354	0.204	0.220	0.390	0.308	28.9
87 %	0.381	0.380	0.325	0.356	0.189	0.326	24.5

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	(65 %)	<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	(65 %)	<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:   87 %   (TOP6C)

6. LOEC Pimephales Lethality:   87 %   (TXP6C)

7. NOEC Pimephales Sublethality:   87 %   (TPP6C)

8. LOEC Pimephales Sublethality:   87 %   (TYP6C)

9. Coefficient of variation for Pimephales growth:   28.9   (TQP6C)

Appendix B: Test 1000.0

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

PERMITTEE: City of Hot Springs  
NPDES NO.: AR0033880 AFIN#26-00145  
CONTACT: Mr. James Sorrells  
ANALYST: 280, 304, 310

2400  
2400  
2400

Test Initiated: DATE: February 24, 2015 TIME: 1145  
Test Terminated: DATE: March 3, 2015 TIME: 1215

DILUTION Control	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.2	8.0	7.8	8.4	8.0	7.8	8.4
Final	7.7	7.6	6.9	8.5	8.1	8.0	7.3
pH Initial	7.6	7.4	7.3	7.0	7.3	7.0	7.2
Final	7.4	7.4	7.1	6.9	7.6	7.0	7.3
Alkalinity	31	NA	32	NA	32	NA	NA
Hardness	44	NA	44	NA	44	NA	NA
Conductivity	120	140	140	140	130	130	170
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 27 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.6	7.9	8.3	8.3	8.4	7.8	8.4
Final	7.8	7.6	7.6	8.1	8.1	8.0	7.9
pH Initial	7.4	7.3	7.3	7.1	7.2	7.1	7.2
Final	7.4	7.3	7.2	7.0	7.6	7.1	7.5
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	130	160	160	170	160	170	190
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 37 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.4	8.0	8.4	8.5	8.7	8.0	8.3
Final	7.7	7.5	7.2	8.0	8.0	8.3	8.1
pH Initial	7.4	7.3	7.3	7.1	7.2	7.2	7.3
Final	7.4	7.4	7.0	6.9	7.7	7.2	7.6
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	130	160	170	180	170	170	210
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 49 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.5	8.2	8.1	8.4	8.3	7.9	8.2
Final	7.8	7.3	7.7	7.6	7.8	7.9	8.0
pH Initial	7.4	7.3	7.3	7.2	7.2	7.2	7.3
Final	7.5	7.3	7.2	7.1	7.7	7.3	7.6
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	140	170	180	180	180	190	240
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 65 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.3	7.9	8.2	8.4	8.6	7.8	8.2
Final	7.6	7.1	7.4	7.9	7.8	8.2	7.8
pH Initial	7.3	7.3	7.3	7.2	7.2	7.4	7.6
Final	7.5	7.4	7.1	7.2	7.7	7.3	7.6
Alkalinity	35	NA	55	NA	53	NA	NA
Hardness	64	NA	73	NA	73	NA	NA
Conductivity	150	170	200	200	200	200	260
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 87 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.9	8.0	8.6	8.3	8.9	8.0	8.4
Final	7.5	7.3	7.6	7.7	8.0	8.0	8.2
pH Initial	7.2	7.2	7.3	7.1	7.1	7.4	7.6
Final	7.5	7.4	7.2	7.2	7.8	7.4	7.7
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	160	180	210	220	230	230	270
Chlorine	NA	NA	NA	NA	NA	NA	NA

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

Permittee: City of Hot Springs

NPDES No.: AR0033880 AFIN#26-00145

Date and Time Test Initiated: February 24, 2015 at 1150

Date and Time Test Terminated: March 2, 2015 at 1315

Dilution water used: Synthetic Soft Water #4187

PERCENT SURVIVAL

Time of Reading	Control	Percent Effluent				
		27 %	37 %	49 %	65 %	87 %
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				
		27 %	37 %	49 %	65 %	87 %
A	32	27	31	32	30	29
B	34	30	32	35	32	32
C	32	32	30	32	30	34
D	33	27	33	32	29	36
E	29	27	31	32	33	35
F	28	28	35	27	29	27
G	28	31	31	29	27	30
H	30	31	27	28	30	33
I	27	28	28	29	32	30
J	29	30	31	29	28	36
Mean per Adult	30.2	29.1	30.9	30.5	30.0	32.2
Mean per Surviving Adult	30.2	29.1	30.9	30.5	30.0	32.2
CV %	7.93	6.57	7.39	8.07	6.29	9.69

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	(65 %)	<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	(65 %)	<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:   87 %   (TOP3B)
6. LOEC *Ceriodaphnia* Lethality:   87 %   (TXP3B)
7. NOEC *Ceriodaphnia* Sublethality:   87 %   (TPP3B)
8. LOEC *Ceriodaphnia* Sublethality:   87 %   (TYP3B)
9. Coefficient of variation for *Ceriodaphnia* Reproduction:   7.93   (TQP3B)

Appendix B: Test 1002.0

CHRONIC TOXICITY SUMMARY FORM  
*Ceriodaphnia dubia*  
CHEMICAL PARAMETERS CHART

PERMITTEE: City of Hot Springs  
NPDES NO.: AR0033880 AFIN#26-00145  
CONTACT: Mr. James Sorrells  
ANALYST: 280, 304, 310

2400  
2400  
2400

Test Initiated: DATE: February 24, 2015 TIME: 1150  
Test Terminated: DATE: March 2, 2015 TIME: 1315

DILUTION Control	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.2	8.0	7.8	8.4	8.0	7.8	8.4
Final	8.1	8.0	8.1	8.6	8.4	8.1	--
pH Initial	7.6	7.4	7.3	7.0	7.3	7.0	7.2
Final	7.4	7.5	7.3	7.2	7.1	7.3	--
Alkalinity	31	NA	32	NA	32	NA	NA
Hardness	44	NA	44	NA	44	NA	NA
Conductivity	120	140	140	140	130	130	170
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 27 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.6	7.9	8.3	8.3	8.4	7.8	8.4
Final	8.1	8.0	8.2	8.5	8.4	8.1	--
pH Initial	7.4	7.3	7.3	7.1	7.2	7.1	7.2
Final	7.4	7.6	7.4	7.4	7.2	7.5	--
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	130	160	160	170	160	170	190
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 37 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.4	8.0	8.4	8.5	8.7	8.0	8.3
Final	8.2	8.0	8.2	8.5	8.5	8.2	--
pH Initial	7.4	7.3	7.3	7.1	7.2	7.2	7.3
Final	7.5	7.6	7.5	7.5	7.3	7.5	--
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	130	160	170	180	170	170	210
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 49 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.5	8.2	8.1	8.4	8.3	7.9	8.2
Final	8.0	7.9	8.1	8.5	8.3	8.1	--
pH Initial	7.4	7.3	7.3	7.2	7.2	7.2	7.3
Final	7.5	7.6	7.6	7.5	7.3	7.6	--
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	140	170	180	180	180	190	240
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 65 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.3	7.9	8.2	8.4	8.6	7.8	8.2
Final	8.4	7.7	8.0	8.1	8.4	8.1	--
pH Initial	7.3	7.3	7.3	7.2	7.2	7.4	7.6
Final	7.5	7.6	7.6	7.5	7.3	7.6	--
Alkalinity	35	NA	55	NA	53	NA	NA
Hardness	64	NA	73	NA	73	NA	NA
Conductivity	150	170	200	200	200	200	260
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 87 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.9	8.0	8.6	8.3	8.9	8.0	8.4
Final	8.4	8.1	7.9	8.5	8.4	8.2	--
pH Initial	7.2	7.2	7.3	7.1	7.1	7.4	7.6
Final	7.5	7.7	7.7	7.6	7.4	7.7	--
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	160	180	210	220	230	230	270
Chlorine	NA	NA	NA	NA	NA	NA	NA



CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: City of Hot Springs		PO No. 15-587		No of BOTTLES		Analyses Requested										AIC Control No. 151831	
Project Reference: Plant Effluent		Sample Matrix		Chronic CD. Chronic FH												AIC Proposal No.	
Project Manager: James Sorrells		WATER SOIL		3												Carrier:	
Sampled By: A. Thomason		GRA B		COMP												Received Temperature °C 1.2°C	
AIC No.		Sample Identification		Date/Time Collected												Remarks	
1		Plant Effluent														DATE + TIME P3: 2-22-15 0000-2400	
																Field pH calibration	
		Container Type		P												on @	
		Preservative		NO												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								A = (NH4)2SO4	
Turnaround Time Requested: (Please circle) NORMAL or EXPEDITED IN _____ DAYS				Relinquished By: A. Thomason		Date/Time 2-23-15 @ 09:55		Received By: M. Wann		Date/Time 2-23-15 @ 09:55							
Expedited results requested by: _____				Relinquished By: M. Wann		Date/Time 2-23-15 10:50		Received in Lab By: [Signature]		Date/Time 2/23/15 1050							
Who should AIC contact with questions: _____				Comments:													
Phone: 501-262-1125 Fax: 501-262-7339																	
Report Attention to: Mr. James Sorrells																	
Report Address to: 320 Davidson Road Hot Springs, AR 71901																	







CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: City of Hot Springs		PO No. 15-587		Analyses Requested												AIC Control No. 181831			
Project Reference: Plant Effluent		Sample Matrix														AIC Proposal No.:			
Project Manager: James Sorrells		WATER SOIL														Carrier:			
Sampled By: H Maucolin		G R A B P														Received Temperature °C 2.2°C			
AIC No. 3		Date/Time Collected 2/26/15 @ 0600-2400														Remarks			
Sample Identification PLANT EFFLUENT		X X																	
Container Type		P														Field pH calibration			
Preservative		NO														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 A = (NH4)2SO4														Buffer:			
Turnaround Time Requested: (Please circle) NORMAL or EXPEDITED IN _____ DAYS				Relinquished By: <i>[Signature]</i> Date/Time 2/27/15 @ 09:20				Received By: M. Mann Date/Time 2-27-15 @ 09:20											
Expedited results requested by: _____				Relinquished By: M. Mann Date/Time 2-27-15 @ 10:35				Received In Lab By: <i>[Signature]</i> Date/Time 2/27/15 10:35											
Who should AIC contact with questions: _____				Comments:															
Phone: _____ Fax: _____																			
Report Attention to: Mr. James Sorrells																			
Report Address to: 320 Davidson Road Hot Springs, AR 71901																			

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City of Hot Springs  
Wastewater Treatment Plant  
320 Davidson Drive  
Hot Springs, AR 71901



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