

August 6, 2012
Test Results of
Third Quarter
Chronic 7-Day Renewal
Biomonitoring Testing
for
Plant Effluent
City of Hot Springs
Control No. 159593-1

*Second Retest of
2nd Quarter*

Prepared for:

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

Prepared by:

AMERICAN INTERPLEX CORPORATION
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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*
Plant Effluent - 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:

Method 1000.0 Chronic *Pimephales promelas* (Fathead minnow) Survival and Growth Test: The No Observable Effects Concentration (NOEC) for survival occurred at 87 % effluent, which is above the critical dilution of 65 %. The NOEC for growth occurred at 87 % effluent, which is above the critical dilution of 65 %. **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 87 % effluent, which is above the critical dilution of 65 %. The NOEC for reproduction occurred at 87 % effluent, which is above the critical dilution of 65 %. **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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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	0.401	PASS
Control Growth CV < or = 40%	10.1	PASS
Growth Minimum Significant Difference 12 to 30%	15.8	PASS
Critical Dilution CV < or = 40%	6.93	PASS

Ceriodaphnia dubia Method 1002.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	100	PASS
Control Reproduction > or = 15 per Surviving Female	17.0	PASS
Control CV < or = 40% per Surviving Female	30.5	PASS
Reproduction Minimum Significant Difference 13 to 47%	31.6	PASS
Critical Dilution CV < or = 40%	26.9	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: Plant Effluent
- b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	7.9	8.1	8.0
pH (standard units)	7.7	8.0	8.1
Alkalinity (mg/l as CaCO ₃)	140	140	140
Hardness (mg/l as CaCO ₃)	120	120	78
Conductivity (umhos/cm)	250	240	230
Residual Chlorine (mg/l)	<0.05	<0.05	<0.05
Ammonia as N (mg/l)	4.4	0.14	<0.1

2. Dilution Water Samples: Synthetic Soft Water #3892

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

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	7.6	7.6	8.0
pH (standard units)	8.0	8.0	7.8
Alkalinity (mg/l as CaCO ₃)	30	30	30
Hardness (mg/l as CaCO ₃)	43	47	43
Conductivity (umhos/cm)	71	71	110
Residual Chlorine (mg/l)	<0.05	<0.05	<0.05

C. Test Methods

1. Test methods used:

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

2. Endpoint: No Observable Effects Concentration (NOEC)

3. Test Conditions:

Pimephales promelas (Fathead minnow) Survival and Growth Method 1000.0

Date & Time Test Initiated: July 24, 2012 at 1130
Date & Time Test Terminated: July 31, 2012 at 0835
Type & Volume of Test Chamber: 500 ml disposable beaker
Volume of Sample: 250 ml
Number of Organisms per replicate: 8
Number of Replicates per dilution: 5

Ceriodaphnia dubia Survival and Growth Method 1002.0

Date & Time Test Initiated: July 24, 2012 at 1130
Date & Time Test Terminated: July 30, 2012 at 1230
Type & Volume of Test Chamber: 30 ml disposable beaker
Volume of Sample: 15 ml
Number of Organisms per replicate: 1
Number of Replicates per dilution: 10

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

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

D. Test Organisms

1. Scientific Name

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

III. Data Analysis

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

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

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

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

IV. Standard Reference Toxicants

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

Pimephales promelas (Fathead minnow)

Chronic reference tests are performed monthly.

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

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

Survival LC-50: 5830 mg/l

Growth IC-25: 4405 mg/l

Growth PMSD: 24

Ceriodaphnia dubia

Chronic reference tests are performed monthly.

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

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

Survival LC-50: 2125 mg/l

Growth IC-25: 1433 mg/l

Growth PMSD: 21.8

V. Chemical Analysis/Quality Control

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

VI. Organism History

Pimephales promelas (Fathead minnow)

Date: July 24, 2012

Age: <24 hours

Source: In-house culture

Water Chemistry Record:

Alkalinity: 57-64 mg/l

Hardness: 80-100 mg/l

Temperature: 25 deg.C

Ceriodaphnia dubia

Date: July 24, 2012

Age: <24 hours

Source: In-house culture

Water Chemistry Record:

Alkalinity: 57-64 mg/l

Hardness: 80-100 mg/l

Temperature: 25 deg.C

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

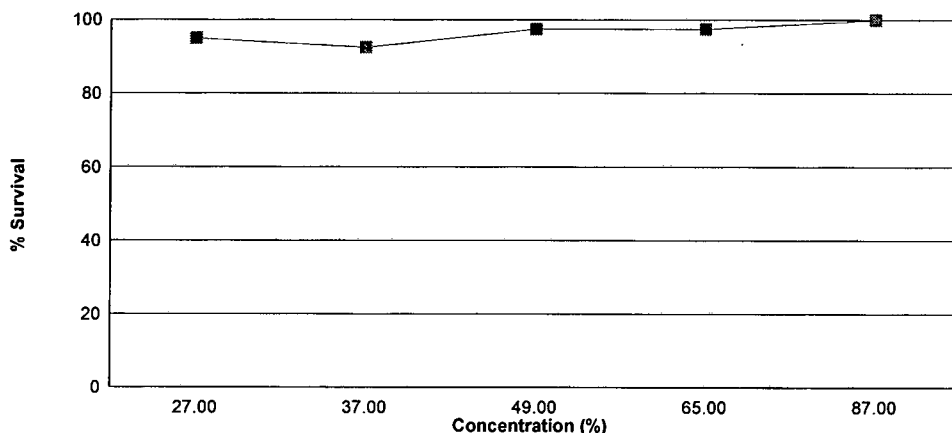
Larvae are exposed in a static renewal system for seven days to different concentrations of effluent with dilution water. Test results are based on the survival and growth (increase in weight) of the larvae.

Effluent dilutions for this test were 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 July 24, 2012 at 1130 and continued through July 31, 2012 at 0835. 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	100	0.401
27 %	95.0	0.376
37 %	92.5	0.357
49 %	97.5	0.411
65 %	97.5	0.387
87 %	100	0.436

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

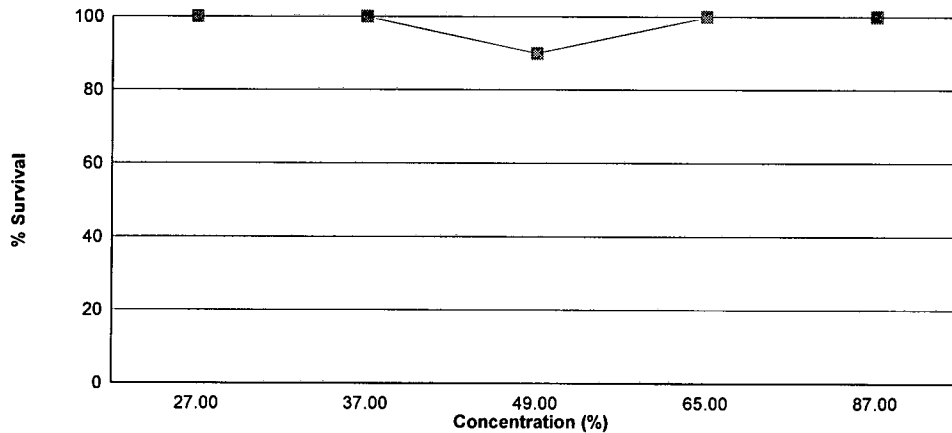
Neonates are exposed in a static renewal system to different concentrations of effluent with dilution water until 60% of surviving control organisms have three broods of offspring with an average of at least 15 young per female.

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 July 24, 2012 at 1130 and continued through July 30, 2012 at 1230. 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



Concentration	Percent Survival	Mean Reproduction
Control	100	17.0
27 %	100	18.8
37 %	100	17.5
49 %	90.0	14.4
65 %	100	16.7
87 %	100	15.3

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Survival

Date and Time Test Initiated: July 24, 2012 at 1130

Date and Time Test Terminated: July 31, 2012 at 0835

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
27 %	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	8	8
	C	7	7	7	7	7	7	7
	D	8	8	8	7	7	7	7
	E	8	8	8	8	8	8	8
37 %	A	7	7	7	7	7	7	7
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	8	8
	D	7	7	6	6	6	6	6
	E	8	8	8	8	8	8	8
49 %	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	8
	E	8	8	8	8	8	8	8
65 %	A	8	7	7	7	7	7	7
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
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	8	8	8	8

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Growth

Test Initiated: July 24, 2012 at 1130
Test Terminated: July 31, 2012 at 0835

Drying Started: July 26, 2012 at 0946
Drying Ended: August 1, 2012 at 1227

Concentration	Replicate	Weight of pan	Weight of pan + fish	Total weight of fish (g)	Original # of fish	Mean dry weight (mg)
Control	A	.94689	.94986	0.00297	8	0.371
	B	.96053	.96342	0.00289	8	0.361
	C	.95965	.96273	0.00308	8	0.385
	D	.94666	.95028	0.00362	8	0.452
	E	.94405	.94753	0.00348	8	0.435
27 %	A	.95472	.95818	0.00346	8	0.432
	B	.95028	.95353	0.00325	8	0.406
	C	.94454	.94789	0.00335	8	0.419
	D	.94908	.95148	0.00240	8	0.300
	E	.94527	.94784	0.00257	8	0.321
37 %	A	.95300	.95562	0.00262	8	0.328
	B	.95755	.96022	0.00267	8	0.334
	C	.95740	.96102	0.00362	8	0.452
	D	.94536	.94790	0.00254	8	0.318
	E	.95542	.95823	0.00281	8	0.351
49 %	A	.94575	.94889	0.00314	8	0.392
	B	.94985	.95317	0.00332	8	0.415
	C	.95372	.95674	0.00302	8	0.378
	D	.95166	.95526	0.00360	8	0.450
	E	.95268	.95603	0.00335	8	0.419
65 %	A	.95920	.96204	0.00284	8	0.355
	B	.95925	.96219	0.00294	8	0.368
	C	.95819	.96134	0.00315	8	0.394
	D	.95855	.96194	0.00339	8	0.424
	E	.95610	.95927	0.00317	8	0.396
87 %	A	.95480	.95869	0.00389	8	0.486
	B	.95785	.96105	0.00320	8	0.400
	C	.95842	.96196	0.00354	8	0.442
	D	.95768	.96103	0.00335	8	0.419
	E	.95350	.95695	0.00345	8	0.431

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: July 24, 2012 at 1130

Date and Time Test Terminated: July 30, 2012 at 1230

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	2	0	0	0	0	0	4	3	0	0	9	10	0.900	
4	0	4	4	3	3	3	0	0	2	2	21	10	2.10	
5	8	9	8	8	7	8	10	9	9	7	83	10	8.30	
6	12	0	0	10	9	0	7	11	8	0	57	10	5.70	
7														
8														
TOTAL	22	13	12	21	19	11	21	23	19	9	170	10	17.0	

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	0	0	0	0	2	0	0	3	2	0	7	10	0.700
4	0	3	2	4	0	4	3	0	0	3	19	10	1.90
5	8	8	9	8	9	4	9	10	9	8	82	10	8.20
6	10	0	9	10	10	11	10	11	9	0	80	10	8.00
7													
8													
TOTAL	18	11	20	22	21	19	22	24	20	11	188	10	18.8

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	2	0	0	0	3	0	4	3	4	0	16	10	1.60
4	0	2	2	0	0	2	0	0	0	3	9	10	0.900
5	8	9	8	9	10	9	10	10	9	9	91	10	9.10
6	10	0	0	5	10	0	10	12	12	0	59	10	5.90
7													
8													
TOTAL	20	11	10	14	23	11	24	25	25	12	175	10	17.5

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: July 24, 2012 at 1130

Date and Time Test Terminated: July 30, 2012 at 1230

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	0	0	0	0	2	0	0	4	1	0	7	10	0.700	
4	3	3	4	4	X	3	2	0	0	3	22	9	2.44	
5	8	8	8	9	X	9	8	10	8	10	78	9	8.67	
6	0	0	8	0	X	0	8	11	10	0	37	9	4.11	
7														
8														
TOTAL	11	11	20	13	2	12	18	25	19	13	144	10	14.4	

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	0	0	0	0	2	0	0	3	0	0	5	10	0.500
4	0	4	3	4	0	4	0	0	4	4	23	10	2.30
5	9	9	9	8	8	10	8	10	9	8	88	10	8.80
6	11	0	0	0	12	0	11	10	7	0	51	10	5.10
7													
8													
TOTAL	20	13	12	12	22	14	19	23	20	12	167	10	16.7

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	0	0	0	0	2	0	2	0	0	0	4	10	0.400
4	3	2	4	4	0	3	0	4	4	4	28	10	2.80
5	7	8	9	10	8	9	8	9	9	9	86	10	8.60
6	0	0	9	0	8	0	9	9	0	0	35	10	3.50
7													
8													
TOTAL	10	10	22	14	18	12	19	22	13	13	153	10	15.3

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	27 %	1	1.00000	1.39310
2	27 %	2	1.00000	1.39310
2	27 %	3	0.87500	1.20940
2	27 %	4	0.87500	1.20940
2	27 %	5	1.00000	1.39310
3	37 %	1	0.87500	1.20940
3	37 %	2	1.00000	1.39310
3	37 %	3	1.00000	1.39310
3	37 %	4	0.75000	1.04720
3	37 %	5	1.00000	1.39310
4	49 %	1	1.00000	1.39310
4	49 %	2	1.00000	1.39310
4	49 %	3	0.87500	1.20940
4	49 %	4	1.00000	1.39310
4	49 %	5	1.00000	1.39310
5	65 %	1	0.87500	1.20940
5	65 %	2	1.00000	1.39310
5	65 %	3	1.00000	1.39310
5	65 %	4	1.00000	1.39310
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	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 = 0.1918		
W = 0.861		
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	27 %	22.50	16.00	5.00	
3	37 %	22.50	16.00	5.00	
4	49 %	25.00	16.00	5.00	
5	65 %	25.00	16.00	5.00	
6	87 %	27.50	16.00	5.00	
Critical values are 1 tailed (k=5)					

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Growth

Shapiro - Wilk's Test for Normality	No Transformation
<p>D = 0.04323 W = 0.9691 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 = 4.414 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	0.01919	0.003838	2.131	
Within (Error)	24	0.04323	0.001801		
Total	29	0.06242			
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					No Transformation	
Ho:Control<Treatment						
Group	Identification	Transformed Mean	Mean In Original Units	T Stat	Sig 0.05	
1	Control	0.4008	0.4008			
2	27 %	0.3756	0.3756	0.9389		
3	37 %	0.3566	0.3566	1.647		
4	49 %	0.4108	0.4108	-0.3726		
5	65 %	0.3874	0.3874	0.4992		
6	87 %	0.4356	0.4356	-1.297		
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	0.06334	15.8	0.0252	
3	37 %	5	0.06334	15.8	0.0442	
4	49 %	5	0.06334	15.8	-0.01	
5	65 %	5	0.06334	15.8	0.0134	
6	87 %	5	0.06334	15.8	-0.0348	

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 %	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
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	1	
4	65 %	10	0	
5	87 %	10	0	

Appendix A2: Statistics

Ceriodaphnia dubia Reproduction

Chi-Square Test for Normality	No Transformation
Chi-Square = 14.492 Critical Chi-Square = 13.28	(alpha = 0.01, df = 4)
Data FAIL normality test (alpha = 0.01).	

Kolmogorov Test for Normality	No Transformation
D = 0.1184 D* = 0.9289 Critical D* = 1.035	(alpha = 0.01, N = 60)
Data PASS normality test (alpha = 0.01).	

Steel's Many-One Rank Test					No Transformation
Ho:Control<Treatment					
Group	Identification	Rank Sum	Critical Value	DF	Sig 0.05
1	Control				
2	27 %	113.00	75.00	10.00	
3	37 %	111.00	75.00	10.00	
4	49 %	92.50	75.00	10.00	
5	65 %	105.00	75.00	10.00	
6	87 %	96.50	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	77.06	15.41	0.6005	
Within (Error)	53	1360	25.66		
Total	58	1437			
Critical F = 3.39 (alpha = 0.01, df = 5,53)					
2.39 (alpha = 0.05, df = 5,53)					
Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)					

Dunnett's Test - Table 1 of 2					No Transformation	
Ho:Control<Treatment						
Group	Identification	Transformed Mean	Mean In Original Units	T Stat	Sig 0.05	
1	Control	17	17			
2	27 %	18.8	18.8	-0.7946		
3	37 %	17.5	17.5	-0.2207		
4	49 %	15.778	15.778	0.525		
5	65 %	16.7	16.7	0.1324		
6	87 %	15.3	15.3	0.7504		
Dunnett's critical value = 2.31 (1 Tailed, alpha = 0.05, df [used] = 5,40) (Actual df = 5,53)						
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	27 %	10	5.233	30.8	-1.8	
3	37 %	10	5.233	30.8	-0.5	
4	49 %	9	5.376	31.6	1.222	
5	65 %	10	5.233	30.8	0.3	
6	87 %	10	5.233	30.8	1.7	

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

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

Date and Time Test Terminated: July 31, 2012 at 0835

Effluent Conc.: Control		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.6	8.1	7.6	7.7	8.0	8.0	7.8
	Final *1	7.5	6.9	7.1	7.7	7.0	7.2	7.2
	Final *2	7.7	8.0	8.1	8.0	7.9	7.8	NA
pH, units	Initial	8.0	8.0	8.0	7.8	7.8	7.7	8.0
	Final *1	7.7	7.7	7.6	7.6	7.5	7.6	7.6
	Final *2	8.2	8.2	8.0	8.1	7.9	7.9	NA
Alkalinity, mg CaCO ₃ /l		30	NA	30	NA	30	NA	NA
Hardness, mg CaCO ₃ /l		43	NA	47	NA	43	NA	NA
Conductivity, umhos/cm		71	69	71	67	110	100	95
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	8.0	7.8	7.3	7.8	8.0	7.9	7.8
	Final *1	7.4	6.9	6.6	7.3	7.3	6.3	7.2
	Final *2	8.2	8.0	8.2	8.2	7.7	7.8	NA
pH, units	Initial	7.9	8.0	8.2	7.7	7.8	7.6	7.8
	Final *1	7.9	7.9	7.7	7.8	7.8	7.7	7.8
	Final *2	8.3	8.4	8.2	8.3	7.9	7.9	NA

Effluent Conc.: 37 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.9	8.0	7.6	7.8	8.0	7.8	7.8
	Final *1	7.7	6.9	6.9	6.9	7.1	7.2	7.2
	Final *2	8.0	7.7	8.0	8.2	7.7	7.9	NA
pH, units	Initial	7.8	8.0	8.2	7.7	7.7	7.6	7.8
	Final *1	8.1	7.9	7.8	7.8	7.8	7.8	7.8
	Final *2	8.4	8.5	8.3	8.3	8.0	8.0	NA

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

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

Date and Time Test Terminated: July 31, 2012 at 0835

Effluent Conc.: 49 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.8	8.0	7.7	7.8	7.9	8.0	7.9
	Final *1	7.7	7.0	7.1	7.4	7.1	7.0	7.2
	Final *2	7.7	8.0	8.1	8.3	8.0	7.9	NA
pH, units	Initial	7.8	8.0	8.3	7.7	7.8	7.6	7.8
	Final *1	8.1	8.0	7.8	7.9	7.8	7.9	7.9
	Final *2	8.4	8.5	8.3	8.4	8.1	8.0	NA

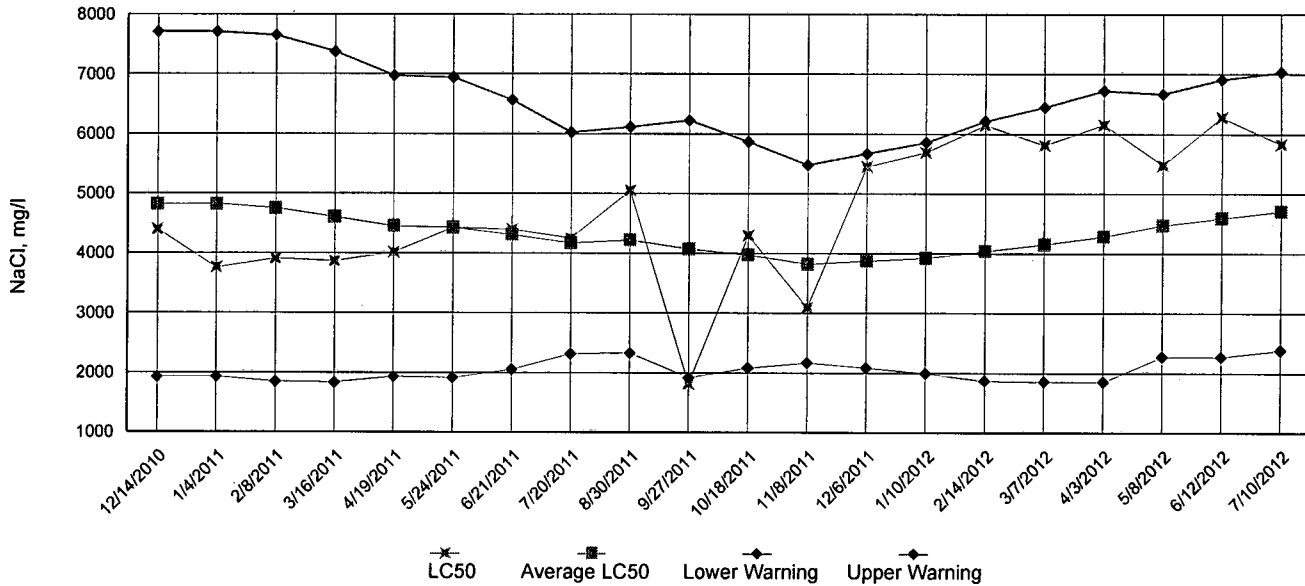
Effluent Conc.: 65 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.2	8.1	7.6	7.7	8.1	8.0	7.7
	Final *1	7.3	7.0	7.0	7.3	7.3	6.4	7.2
	Final *2	8.0	8.1	8.2	8.0	7.8	7.8	NA
pH, units	Initial	7.8	8.1	8.4	7.7	7.7	7.6	7.8
	Final *1	8.1	8.1	7.9	7.9	8.0	7.7	7.9
	Final *2	8.5	8.6	8.4	8.4	8.0	8.0	NA
Alkalinity, mg CaCO ₃ /l	110	NA	93	NA	99	NA	NA	NA
Hardness, mg CaCO ₃ /l	93	NA	95	NA	55	NA	NA	NA
Conductivity, umhos/cm	190	180	180	170	260	160	150	
Res. Chlorine, mg/l	<0.05	NA	<0.05	NA	<0.05	NA	NA	NA

Effluent Conc.: 87 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.3	7.8	7.6	7.7	8.1	8.0	7.7
	Final *1	7.2	7.0	7.1	7.3	7.5	6.6	7.2
	Final *2	7.9	8.0	8.1	8.2	7.9	8.0	NA
pH, units	Initial	7.8	8.1	8.5	7.7	7.7	7.6	7.7
	Final *1	8.1	8.1	8.0	8.0	8.0	7.8	8.0
	Final *2	8.4	8.6	8.4	8.5	8.2	8.1	NA

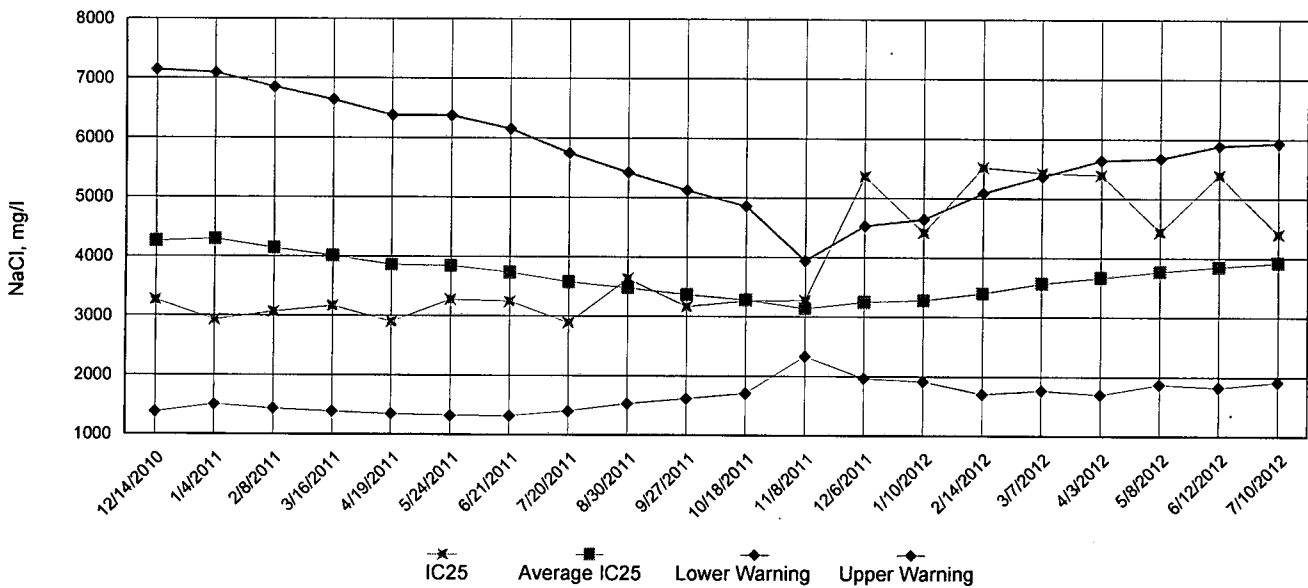
*1 = data from the *Pimephales promelas* (Fathead Minnow) test *2 = data from the *Ceriodaphnia dubia* test

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

LC50 Survival Data

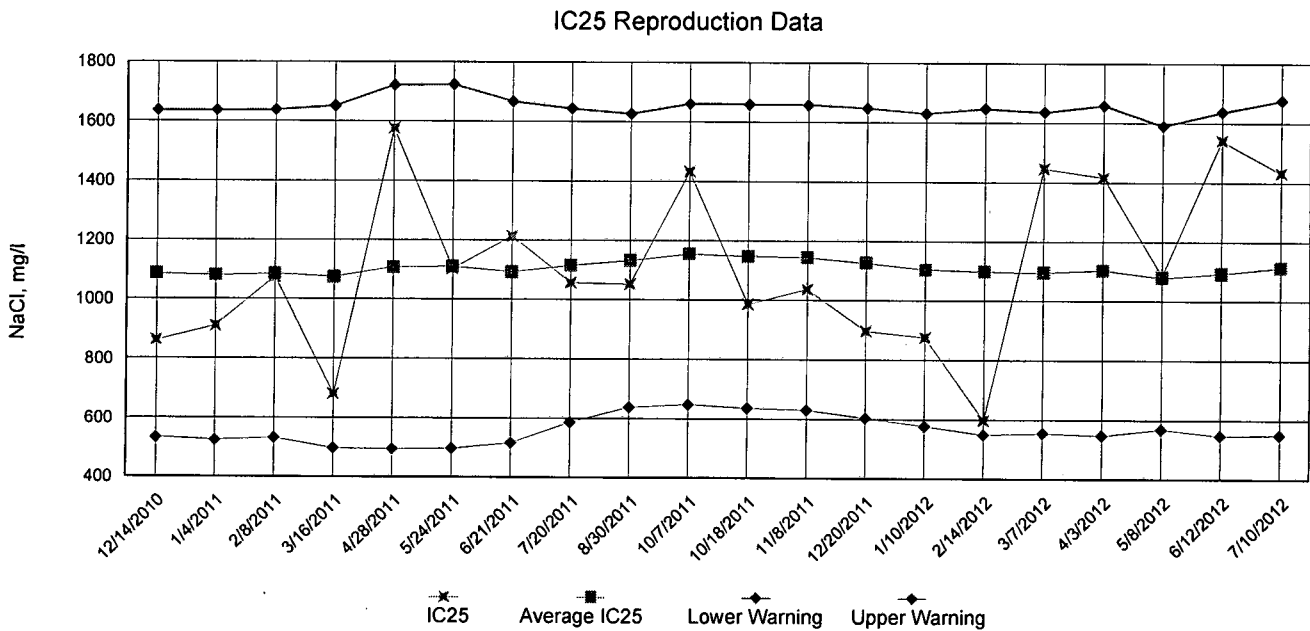
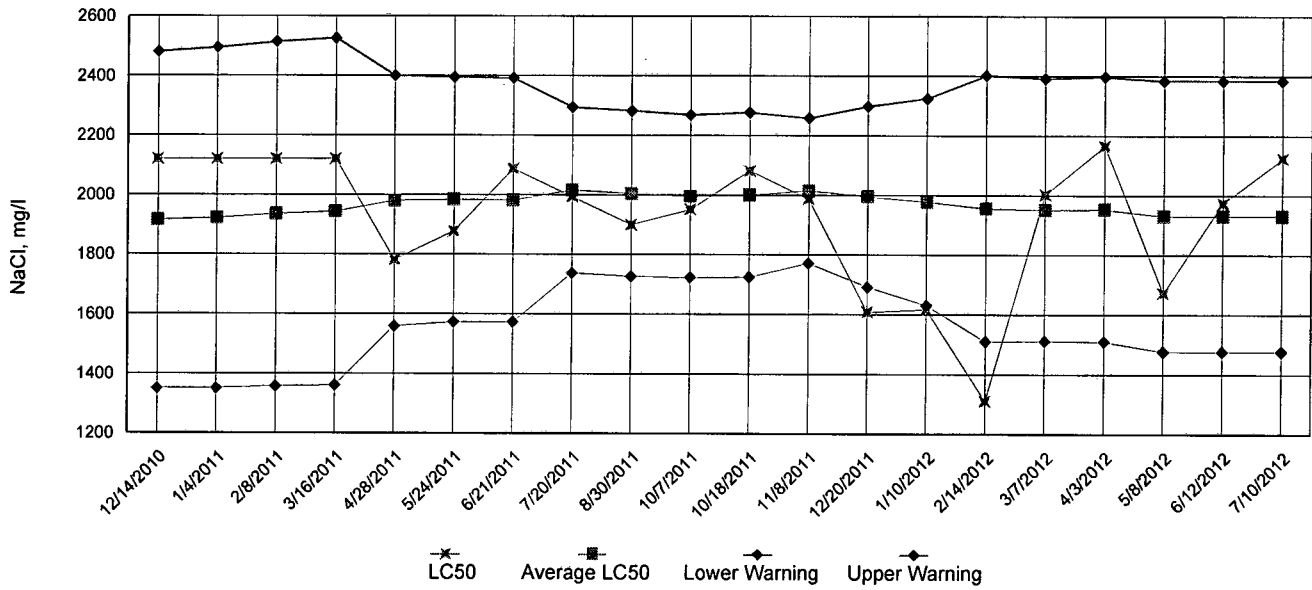


IC25 Growth Data



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

LC50 Survival Data



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: July 24, 2012 at 1130

Date and Time Test Terminated: July 31, 2012 at 0835

Dilution water used: Synthetic Soft Water #3892

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
27 %	100	100	87.5	87.5	100	97.5	97.5	95.0	7.21
37 %	87.5	100	100	75.0	100	95.0	95.0	92.5	12.1
49 %	100	100	87.5	100	100	100	97.5	97.5	5.73
65 %	87.5	100	100	100	100	100	97.5	97.5	5.73
87 %	100	100	100	100	100	100	100	100	0.00

DATA TABLE FOR GROWTH

Effluent Conc. %	Average dry weight, mg replicate chambers					Mean dry weight, mg	CV%
	A	B	C	D	E		
Control	0.371	0.361	0.385	0.452	0.435	0.401	10.1
27 %	0.432	0.406	0.419	0.300	0.321	0.376	16.1
37 %	0.328	0.334	0.452	0.318	0.351	0.357	15.3
49 %	0.392	0.415	0.378	0.450	0.419	0.411	6.72
65 %	0.355	0.368	0.394	0.424	0.396	0.387	6.93
87 %	0.486	0.400	0.442	0.419	0.431	0.436	7.39

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	(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: 10.1 (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: 275, 280, 298, 304

2400
2400
2400

Test Initiated: DATE: July 24, 2012 TIME: 1130
Test Terminated: DATE: July 31, 2012 TIME: 0835

DILUTION Control	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.6	8.1	7.6	7.7	8.0	8.0	7.8
Final	7.5	6.9	7.1	7.7	7.0	7.2	7.2
pH Initial	8.0	8.0	8.0	7.8	7.8	7.7	8.0
Final	7.7	7.7	7.6	7.6	7.5	7.6	7.6
Alkalinity	30	NA	30	NA	30	NA	NA
Hardness	43	NA	47	NA	43	NA	NA
Conductivity	71	69	71	67	110	100	95
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 27 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	7.8	7.3	7.8	8.0	7.9	7.8
Final	7.4	6.9	6.6	7.3	7.3	6.3	7.2
pH Initial	7.9	8.0	8.2	7.7	7.8	7.6	7.8
Final	7.9	7.9	7.7	7.8	7.8	7.7	7.8
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	120	110	110	110	160	150	140
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 37 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.9	8.0	7.6	7.8	8.0	7.8	7.8
Final	7.7	6.9	6.9	6.9	7.1	7.2	7.2
pH Initial	7.8	8.0	8.2	7.7	7.7	7.6	7.8
Final	8.1	7.9	7.8	7.8	7.8	7.8	7.8
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	140	130	130	130	190	170	150
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 49 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.8	8.0	7.7	7.8	7.9	8.0	7.9
Final	7.7	7.0	7.1	7.4	7.1	7.0	7.2
pH Initial	7.8	8.0	8.3	7.7	7.8	7.6	7.8
Final	8.1	8.0	7.8	7.9	7.8	7.9	7.9
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	160	150	150	150	160	180	170
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 65 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.2	8.1	7.6	7.7	8.1	8.0	7.7
Final	7.3	7.0	7.0	7.3	7.3	6.4	7.2
pH Initial	7.8	8.1	8.4	7.7	7.7	7.6	7.8
Final	8.1	8.1	7.9	7.9	8.0	7.7	7.9
Alkalinity	110	NA	93	NA	99	NA	NA
Hardness	93	NA	95	NA	55	NA	NA
Conductivity	190	180	180	170	260	160	150
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 87 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.3	7.8	7.6	7.7	8.1	8.0	7.7
Final	7.2	7.0	7.1	7.3	7.5	6.6	7.2
pH Initial	7.8	8.1	8.5	7.7	7.7	7.6	7.7
Final	8.1	8.1	8.0	8.0	8.0	7.8	8.0
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	230	220	210	210	290	260	250
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: July 24, 2012 at 1130

Date and Time Test Terminated: July 30, 2012 at 1230

Dilution water used: Synthetic Soft Water #3892

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	90.0	100	100

NUMBER OF YOUNG PRODUCED PER FEMALE @ 6 DAYS

Replicates	Control	Percent Effluent				
		27 %	37 %	49 %	65 %	87 %
A	22	18	20	11	20	10
B	13	11	11	11	13	10
C	12	20	10	20	12	22
D	21	22	14	13	12	14
E	19	21	23	2	22	18
F	11	19	11	12	14	12
G	21	22	24	18	19	19
H	23	24	25	25	23	22
I	19	20	25	19	20	13
J	9	11	12	13	12	13
Mean per Adult	17.0	18.8	17.5	14.4	16.7	15.3
Mean per Surviving Adult	17.0	18.8	17.5	15.8	16.7	15.3
CV %	30.5	23.6	36.9	31.2	26.9	30.0

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. 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	(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: 30.5 (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: 275, 280, 298, 304

2400
2400
2400

Test Initiated: DATE: July 24, 2012 TIME: 1130
Test Terminated: DATE: July 30, 2012 TIME: 1230

DILUTION	DAY						
	1	2	3	4	5	6	7
Control							
D.O. Initial	7.6	8.1	7.6	7.7	8.0	8.0	7.8
Final	7.7	8.0	8.1	8.0	7.9	7.8	NA
pH Initial	8.0	8.0	8.0	7.8	7.8	7.7	8.0
Final	8.2	8.2	8.0	8.1	7.9	7.9	NA
Alkalinity	30	NA	30	NA	30	NA	NA
Hardness	43	NA	47	NA	43	NA	NA
Conductivity	71	69	71	67	110	100	95
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
27 %							
D.O. Initial	8.0	7.8	7.3	7.8	8.0	7.9	7.8
Final	8.2	8.0	8.2	8.2	7.7	7.8	NA
pH Initial	7.9	8.0	8.2	7.7	7.8	7.6	7.8
Final	8.3	8.4	8.2	8.3	7.9	7.9	NA
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	120	110	110	110	160	150	140
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
37 %							
D.O. Initial	7.9	8.0	7.6	7.8	8.0	7.8	7.8
Final	8.0	7.7	8.0	8.2	7.7	7.9	NA
pH Initial	7.8	8.0	8.2	7.7	7.7	7.6	7.8
Final	8.4	8.5	8.3	8.3	8.0	8.0	NA
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	140	130	130	130	190	170	150
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
49 %							
D.O. Initial	7.8	8.0	7.7	7.8	7.9	8.0	7.9
Final	7.7	8.0	8.1	8.3	8.0	7.9	NA
pH Initial	7.8	8.0	8.3	7.7	7.8	7.6	7.8
Final	8.4	8.5	8.3	8.4	8.1	8.0	NA
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	160	150	150	150	160	180	170
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
65 %							
D.O. Initial	8.2	8.1	7.6	7.7	8.1	8.0	7.7
Final	8.0	8.1	8.2	8.0	7.8	7.8	NA
pH Initial	7.8	8.1	8.4	7.7	7.7	7.6	7.8
Final	8.5	8.6	8.4	8.4	8.0	8.0	NA
Alkalinity	110	NA	93	NA	99	NA	NA
Hardness	93	NA	95	NA	55	NA	NA
Conductivity	190	180	180	170	260	160	150
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
87 %							
D.O. Initial	8.3	7.8	7.6	7.7	8.1	8.0	7.7
Final	7.9	8.0	8.1	8.2	7.9	8.0	NA
pH Initial	7.8	8.1	8.5	7.7	7.7	7.6	7.7
Final	8.4	8.6	8.4	8.5	8.2	8.1	NA
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	230	220	210	210	290	260	250
Chlorine	NA	NA	NA	NA	NA	NA	NA

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: <u>Hot Springs Wastewater</u>			PO No. <u>12-2862</u>		No of BOTTLES	Analyses Requested <u>Bio Monitoring</u>										AIC Control No: <u>159595</u>				
Project Reference: <u>Jim Sorrells</u>			Sample Matrix													AIC Proposal No:				
Project Manager: <u>Jim Sorrells</u>			Sampled By: <u>A. Ross</u>			Carrier:		Received Temperature °C <u>25</u>												
AIC No.	Sample Identification	Date/Time Collected	GRAM	COMP	WATER	SOIL	No of BOTTLES	Analyses Requested										Remarks		
<u>14</u>	<u>Plant Effluent</u>	<u>7-22-12 0000-2400</u>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>													<u>3</u>	Field pH calibration on _____ @ _____	
Container Type			Preservative				<u>P</u>											Buffer:		
G = Glass NO = none			P = Plastic S = Sulfuric acid pH2		V = VOA vials N = Nitric acid pH2		H = HCl to pH2 B = NaOH to pH12		T = Sodium Thiosulfate Z = Zinc acetate											
Turnaround Time Requested: (Please circle) NORMAL or EXPEDITED IN _____ DAYS							Relinquished By: <u>A. Thompson</u>		Date/Time <u>7-23-12 @ 1040</u>		Received By: <u>M. Mann</u>		Date/Time <u>7-23-12 10:40AM</u>							
Expedited results requested by: _____							Relinquished By: <u>M. Mann</u>		Date/Time <u>7-23-12 @ 11:50</u>		Received in Lab By: <u>[Signature]</u>		Date/Time <u>7-23-12 11:50</u>							
Who should AIC contact with questions: _____							Comments:													
Phone: _____ Fax: _____																				
Report Attention to: _____																				
Report Address to: _____																				



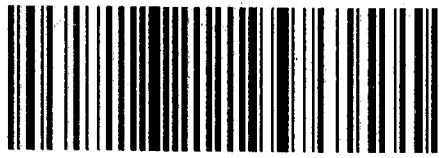
CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: <u>Hot Springs Wastewater</u>		PO No. <u>12-2862</u>	No of B O T T L E S	Analyses Requested <p align="center" style="font-size: 2em;">Bio Monitoring</p>												AIC Control No. <u>159593</u>
Project Reference: Project Manager: <u>Jim Sorrells</u>		Sample Matrix		AIC Proposal No.												
Sampled By: <u>A. Ross</u>		W A T E R		Carrier:												
AIC No.	Sample Identification	Date/Time Collected	G R A B	C O M P	S O I L											Received Temperature °C <u>20</u>
<u>2</u>	<u>Plant Effluent</u>	<u>7-24-12 0000-2400</u>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>					<u>3</u>	<input checked="" type="checkbox"/>					Remarks
															Field pH calibration on _____ @ _____	
Container Type																Buffer:
Preservative																
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>A. Thomas</u>		Date/Time <u>7-25-12 @ 0925</u>		Received By: <u>m.mann</u>		Date/Time <u>7-25-12 9:25</u>		
Expedited results requested by: _____								Relinquished By: <u>m.mann</u>		Date/Time <u>7-25-12 11:10am</u>		Received in Lab By: <u>[Signature]</u>		Date/Time <u>7-25-12 11:10am</u>		
Who should AIC contact with questions: _____								Comments:								
Phone: _____ Fax: _____																
Report Attention to: _____																
Report Address to: _____																

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: <u>Hot Springs Wastewater</u>			PO No. <u>12-2862</u>		NO OF BOTTLES	ANALYSES REQUESTED										PAGE OF	
Project Reference:			SAMPLE MATRIX			Bio Monitoring										AIC CONTROL NO: <u>149993</u>	
Project Manager: <u>Jim Sorrells</u>			WATER SOIL		AIC PROPOSAL NO:												
Sampled By: <u>AT</u>			GRA	COMP	Carrier: <u>Hot Springs Shuttle</u>												
AIC No.	Sample Identification	Date/Time Collected				Received Temperature C											
<u>3</u>	<u>Plant Effluent</u>	<u>7-26-12 0000-2400</u>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<u>3</u>	<u>2°C</u>											
						Remarks											
						Field pH calibration											
						on _____ @ _____											
						Buffer: _____											
G = Glass P = Plastic NO = none S = Sulfuric acid pH2			V = VOA vials N = Nitric acid pH2			H = HCl to pH2 B = NaOH to pH12			T = Sodium Thiosulfate Z = Zinc acetate								
Turnaround Time Requested: (Please circle) <u>NORMAL</u> or EXPEDITED IN _____ DAYS							Relinquished By: <u>A. Thomas</u>		Date/Time: <u>7-27-12 @ 10:55</u>		Received By: <u>M. Mann</u>		Date/Time: <u>7-27-12 10:55AM</u>				
Expedited results requested by: <u>Same</u>							Relinquished By: <u>M. Mann</u>		Date/Time: <u>7-27-12 11:53</u>		Received in Lab By: <u>[Signature]</u>		Date/Time: <u>7-27-12 11:55AM</u>				
Who should AIC contact with questions: <u>J. Sorrells</u>							Comments:										
Phone: <u>501-262-1125</u> Fax: <u>501-262-0379</u>																	
Report Attention to: _____																	
Report Address to: _____																	

CERTIFIED MAIL™



7010 0290 0000 5195 6537



City of Hot Springs
780 Adams St
Hot Springs, AR 71901

ADEQ
NPDES Enforcement Section
Attn: Mo Shafii
5301 Northshore Dr.
North Little Rock, AR 72118-5317

