

# Sanitary Sewer Overflow (SSO) Monthly Report

Facility Name: Hot Springs Wastewater NPDES Permit No.: AR0033880 Monitoring Period (Month/Year) June / 2014

No Sanitary Sewer Overflows This Monitoring Period

Summary Report Code Descriptions				
Cause(s) of SSO	SSO Impact	Action(s) Taken	Ultimate Discharge Location	
CO-Construction	D-Debris	NEAH-No Evidence Adverse Health/Environmental Impact		CR-Creek/Stream/River (specify)
E-Equipment Failure	G-Grease	OEHC-Observed or Evidence of Human Contact	EC-Environmental Cleanup	DI-Ditch
HC-Hydro Clean	LF-Line Failure	EFK-Evidence of Fish Kill	HC-Hydro Cleaned	DR-Drop Inlet
R-Rainfall	RG-Roots/Grease		HR-Hand Rodded	GR-Ground Surface
RO-Roots	V-Vandalism		EN-Referred to Engineering	PA-Paved Area
			PN-Public Notification	CB-Contained in Building

Location	Manhole #	Start Date of SSO	End Date of SSO	Estimated Volume (in gallons)	Cause of SSO	Environmental Impact	Action(s) Taken to Address SSO	Discharge Location
Fontana Rd.	MH# 1865	06/09/2014	06/09/2014	10000	R	NEAH	HC & EC	CR-Hot Springs
900 Blk. Carpenter Dam Rd.	Main Line	06/09/2014	06/10/2014	Undetermined	R & LF	NEAH	HC & EC	CR-Unknown
Carpenter Dam Rd.	MH# 5260	06/09/2014	06/09/2014	3500	R	NEAH	HC & EC	CR-Unknown
Carpenter Dam Rd.	MH# 5259	06/09/2014	06/10/2014	7500	R	NEAH	HC & EC	CR-Unknown
Catherine Heights Rd.	MH# 1750	06/09/2014	06/10/2014	20000	R	NEAH	HC & EC	CR-Gulpha
Spring St.	MH# 4118	06/09/2014	06/10/2014	8000	R	NEAH	HC & EC	CR-Gulpha
Television Hill Rd.	MH# 12242	06/09/2014	06/10/2014	20000	R	NEAH	HC & EC	CR-Hot Springs
655 Belvedere	MH# 10984	06/10/2014	06/10/2014	1500	E	NEAH	HC & EC	GR
4248 Park Ave	Ftn. Lake PS	06/10/2014	06/10/2014	2000	E	NEAH	HC & EC	CR-Unknown

Signature of Cognizant or Ranking Official

7-21-2014  
Date

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are

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		PN-Public Notification	CB-Contained in Building

Location	Manhole #	Start Date of SSO	End Date of SSO	Estimated Volume (in gallons)	Cause of SSO	Environmental Impact	Action(s) Taken to Address SSO	Discharge Location
Port Au Prince Pump Station	Pump Station	06/02/2014	06/02/2014	1500	E	NEAH	HC & EC	CR-Lake Hamilton
Aberina St.	Manhole# 8172	06/08/2014	06/08/2014	4000	R	NEAH	HC	CR-Lake Hamilton
Lakeland & Lake Hamilton Dr.	Manhole # 8347	06/08/2014	06/08/2014	1500	E	NEAH	HC	CR-Lake Hamilton
Television Hill Rd.	MH# 12242	06/09/2014		Still overflowing	R	NEAH		CR-Hot Springs
Spring St.	MH# 4118	06/09/2014		Still overflowing	R	NEAH		CR-Gulpha
Catherine Heights Rd.	MH# 1750	06/09/2014		Still overflowing	R	NEAH		CR-Gulpha
Carpenter Dam Rd.	MH#5259	06/09/2014		Still overflowing	R	NEAH		CR-Unknown
Carpenter Dam Rd.	MH# 5260	06/09/2014		Still overflowing	R	NEAH		CR-Unknown
900 Block Carpenter Dam Rd.	Main Line	06/09/2014		Still overflowing	R & LF	NEAH		CR-Unknown
Fontana Rd.	MH# 1865	06/09/2014		Still overflowing	R	NEAH		CR-Hot Springs
215 Hwy 290	Lift Station	06/09/2014	06/09/2014	2500	Power Failure	NEAH	HC & EC	CR-Lake Hamilton

  
Signature of Cognizant or Ranking Official

7-21-2014  
Date

May 27, 2014

Test Results of  
Second Quarter  
Chronic 7-Day Renewal  
Biomonitoring Testing  
for  
Plant Effluent  
City of Hot Springs

Control No. 178466-1

Prepared for:

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

Prepared by:

AMERICAN INTERPLEX CORPORATION  
8600 Kanis Road  
Little Rock, AR 72204-2322



May 27, 2014  
Control No. 178466-1  
Page 2 of 31

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:

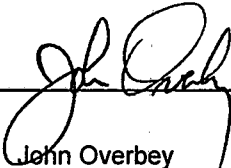
This report is the analytical results and supporting information for the samples submitted to American Interplex Corporation (AIC). The following results are applicable only to the sample identified by the control number referenced above. Accurate assessment of the data requires access to the entire 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

PDF cc: City of Hot Springs  
ATTN: Ms. Jessica Burks  
jburks@cityhs.net

City of Hot Springs  
ATTN: Mr. Dennis Brunson  
dbrunson@cityhs.net

City of Hot Springs  
ATTN: Mr. James Sorrells  
jsorrells@cityhs.net

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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	0.254	PASS
Control Growth CV < or = 40%	4.56	PASS
Growth Minimum Significant Difference 12 to 30%	20.1	PASS
Critical Dilution CV < or = 40%	27.9	PASS

*Ceriodaphnia dubia* Method 1002.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	100	PASS
Control Reproduction > or = 15 per Surviving Female	22.7	PASS
Control CV < or = 40% per Surviving Female	17.1	PASS
Reproduction Minimum Significant Difference 13 to 47%	17.9	PASS
Critical Dilution CV < or = 40%	9.50	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	7.9	9.0
pH (standard units)	7.9	7.6	7.3
Alkalinity (mg/l as CaCO <sub>3</sub> )	130	130	69
Hardness (mg/l as CaCO <sub>3</sub> )	140	140	89
Conductivity (umhos/cm)	420	400	260
Residual Chlorine (mg/l)	<0.05	<0.05	<0.05
Ammonia as N (mg/l)	<0.1	0.47	<0.1

2. Dilution Water Samples: Synthetic Soft Water #4098

- a. Dates Prepared: May 9 through May 23, 2014
- b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	7.7	8.3	8.2
pH (standard units)	7.5	7.2	7.4
Alkalinity (mg/l as CaCO <sub>3</sub> )	62	62	62
Hardness (mg/l as CaCO <sub>3</sub> )	43	42	46
Conductivity (umhos/cm)	170	150	150
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: May 13, 2014 at 1350  
Date & Time Test Terminated: May 20, 2014 at 1230  
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: May 13, 2014 at 1130  
Date & Time Test Terminated: May 20, 2014 at 1330  
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 April 1, 2014 at 1715 to April 8, 2014 at 1655

The results were as follows: (Control No. 177015-1.)

Survival LC-50: 4852.9 mg/l

Growth IC-25: 2979 mg/l

Growth PMSD: 11.8

*Ceriodaphnia dubia*

Chronic reference tests are performed monthly.

A chronic reference test was performed on April 1, 2014 at 1700 to April 8, 2014 at 1510

The results were as follows: (Control No. 177015-2.)

Survival LC-50: 1968 mg/l

Growth IC-25: 1264 mg/l

Growth PMSD: 14.6

V. Chemical Analysis/Quality Control

Parameter	Method	% Recovery	Relative % Difference
Alkalinity	SM 2320 B	NA	0.00
Hardness	EPA 200.7	98.9	1.40
pH	SM 4500-H+ B	100	1.21
Conductivity	EPA 120.1	102	6.90

VI. Organism History

*Pimephales promelas* (Fathead minnow)

Date: May 13, 2014

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: May 13, 2014

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

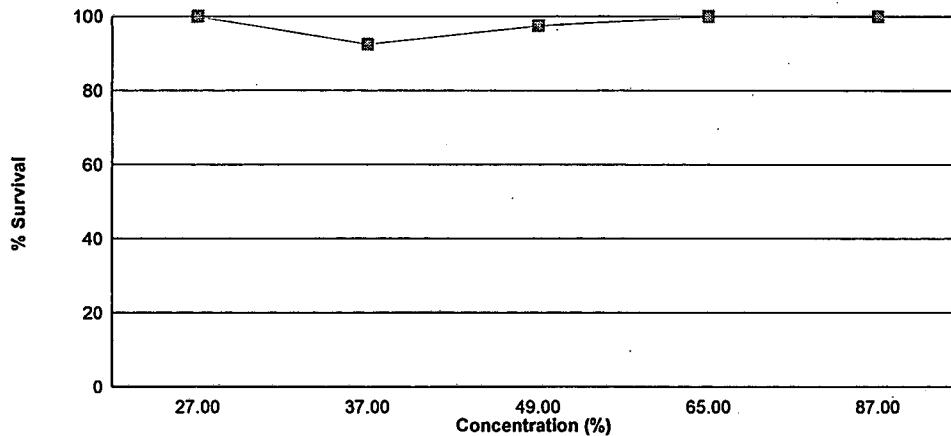
Larvae are exposed in a static renewal system for seven days to different concentrations of effluent with dilution water. Test results are based on the survival and growth (increase in weight) of the larvae.

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 May 13, 2014 at 1350 and continued through May 20, 2014 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 growth = 87 % effluent



Summary of the 7-day Fathead Minnow Survival and Growth		
Concentration	Percent Survival	Mean Growth (mg)
Control	100	0.254
27 %	100	0.257
37 %	92.5	0.232
49 %	97.5	0.249
65 %	100	0.214
87 %	100	0.218

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

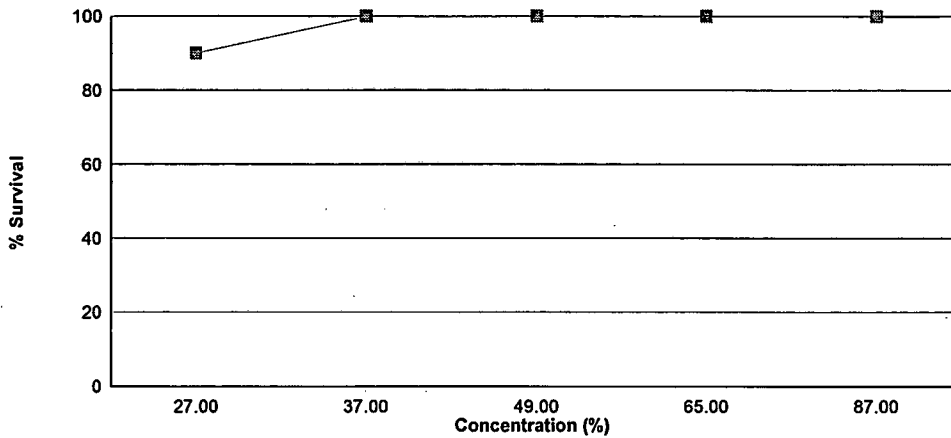
Neonates are exposed in a static renewal system to different concentrations of effluent with dilution water until 60% of surviving control organisms have three broods of offspring with an average of at least 15 young per female.

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 May 13, 2014 at 1130 and continued through May 20, 2014 at 1330. 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	22.7
27 %	90.0	31.4
37 %	100	33.2
49 %	100	30.0
65 %	100	33.2
87 %	100	34.2

Appendix A1: Test 1000.0

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

Date and Time Test Initiated: May 13, 2014 at 1350

Date and Time Test Terminated: May 20, 2014 at 1230

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	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
37 %	A	8	8	8	8	8	8	8
	B	8	8	8	8	7	7	7
	C	8	8	8	8	6	6	6
	D	8	8	8	8	8	8	8
	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	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	7	7	7
65 %	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
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: May 13, 2014 at 1350  
Test Terminated: May 20, 2014 at 1230

Drying Started: May 19, 2014 at 1620  
Drying Ended: May 21, 2014 at 1315

Concentration	Replicate	Weight of pan	Weight of pan + fish	Total weight of fish (g)	Original # of fish	Mean dry weight (mg)
Control	A	.92195	.92383	0.00188	8	0.235
	B	.92433	.92637	0.00204	8	0.255
	C	.92171	.92383	0.00212	8	0.265
	D	.92419	.92628	0.00209	8	0.261
	E	.92492	.92694	0.00202	8	0.252
27 %	A	.92206	.92404	0.00198	8	0.248
	B	.92485	.92683	0.00198	8	0.248
	C	.92690	.92897	0.00207	8	0.259
	D	.92554	.92760	0.00206	8	0.258
	E	.92947	.93166	0.00219	8	0.274
37 %	A	.92296	.92479	0.00183	8	0.229
	B	.92280	.92428	0.00148	8	0.185
	C	.91848	.92008	0.00160	8	0.200
	D	.91991	.92194	0.00203	8	0.254
	E	.92001	.92233	0.00232	8	0.290
49 %	A	.91886	.92074	0.00188	8	0.235
	B	.92323	.92533	0.00210	8	0.262
	C	.92394	.92624	0.00230	8	0.288
	D	.92347	.92536	0.00189	8	0.236
	E	.92440	.92620	0.00180	8	0.225
65 %	A	.92173	.92301	0.00128	8	0.160
	B	.92165	.92386	0.00221	8	0.276
	C	.93295	.93517	0.00222	8	0.278
	D	.93102	.93260	0.00158	8	0.198
	E	.93324	.93450	0.00126	8	0.158
87 %	A	.93221	.93385	0.00164	8	0.205
	B	.92781	.92925	0.00144	8	0.180
	C	.92894	.93079	0.00185	8	0.231
	D	.92696	.92897	0.00201	8	0.251
	E	.92343	.92523	0.00180	8	0.225

Appendix A1: Test 1002.0

*Ceriodaphnia dubia* Survival and Reproduction

Date and Time Test Initiated: May 13, 2014 at 1130

Date and Time Test Terminated: May 20, 2014 at 1330

Concentration: Control														
Day	Replicate										No. of Young	No. of Adults	Young per Adult	
	1	2	3	4	5	6	7	8	9	10				
1	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
4	3	3	4	4	3	6	4	4	4	3	38	10	3.80	
5	9	8	9	10	10	8	9	10	8	10	91	10	9.10	
6	0	0	0	0	0	0	0	0	0	0	0	10	0.00	
7	12	11	11	0	12	13	10	5	15	9	98	10	9.80	
8														
TOTAL	24	22	24	14	25	27	23	19	27	22	227	10	22.7	

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	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
4	4	3	4	3	3	4	3	4	6	5	39	10	3.90	
5	11	13	12	11	12	10	14	9	13X	12	117	9	13.0	
6	0	0	0	0	0	0	0	0	X	0	0	9	0.00	
7	17	17	20	20	19	17	16	15	X	17	158	9	17.6	
8														
TOTAL	32	33	36	34	34	31	33	28	19	34	314	10	31.4	

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	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
4	4	4	3	4	3	3	4	0	5	4	34	10	3.40	
5	12	14	9	14	11	0	13	14	10	9	106	10	10.6	
6	0	0	0	0	0	0	0	14	14	0	28	10	2.80	
7	17	18	18	16	18	22	20	0	16	19	164	10	16.4	
8														
TOTAL	33	36	30	34	32	25	37	28	45	32	332	10	33.2	

Appendix A1: Test 1002.0

*Ceriodaphnia dubia* Survival and Reproduction

Date and Time Test Initiated: May 13, 2014 at 1130  
Date and Time Test Terminated: May 20, 2014 at 1330

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	0	0	0	0	0	0	0	0	10	0.00
4	4	4	4	3	4	4	5	4	3	0	35	10	3.50	
5	9	0	11	10	10	9	7	8	5	9	78	10	7.80	
6	0	0	0	0	0	0	0	0	0	0	0	10	0.00	
7	17	15	19	19	19	19	20	17	22	20	187	10	18.7	
8														
TOTAL	30	19	34	32	33	32	32	29	30	29	300	10	30.0	

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	0	0	0	0	0	0	0	10	0.00	
4	4	3	4	4	4	2	4	3	4	4	36	10	3.60	
5	12	12	10	11	9	13	11	11	14	5	108	10	10.8	
6	0	0	0	0	0	0	0	0	0	0	0	10	0.00	
7	18	19	18	19	20	21	17	17	21	18	188	10	18.8	
8														
TOTAL	34	34	32	34	33	36	32	31	39	27	332	10	33.2	

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	0	0	0	0	0	0	0	10	0.00	
4	4	4	3	4	3	3	5	4	3	4	37	10	3.70	
5	11	7	10	13	9	10	11	14	13	12	110	10	11.0	
6	0	0	0	0	0	0	0	0	0	0	0	10	0.00	
7	22	18	20	20	18	20	19	20	18	20	195	10	19.5	
8														
TOTAL	37	29	33	37	30	33	35	38	34	36	342	10	34.2	

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	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	1.00000	1.39310	
2	27 %	4	1.00000	1.39310	
2	27 %	5	1.00000	1.39310	
3	37 %	1	1.00000	1.39310	
3	37 %	2	0.87500	1.20940	
3	37 %	3	0.75000	1.04720	
3	37 %	4	1.00000	1.39310	
3	37 %	5	1.00000	1.39310	
4	49 %	1	1.00000	1.39310	
4	49 %	2	1.00000	1.39310	
4	49 %	3	1.00000	1.39310	
4	49 %	4	1.00000	1.39310	
4	49 %	5	0.87500	1.20940	
5	65 %	1	1.00000	1.39310	
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))
<p>D = 0.1243 W = 0.6918 Critical W = 0.9 (alpha = 0.01, N = 30) Critical W = 0.927 (alpha = 0.05, N = 30)</p> <p>Data FAIL normality test (alpha = 0.01).</p>		

Steel's Many-One Rank Test				Transform: Arc Sin(Square Root(Y))	
Ho: Control < Treatment					
Group	Identification	Rank Sum	Critical Value	DF	Sig 0.05
1	Control				
2	27 %	27.50	16.00	5.00	
3	37 %	22.50	16.00	5.00	
4	49 %	25.00	16.00	5.00	
5	65 %	27.50	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 = 0.02788 W = 0.9615 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 = 14.49 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	0.008719	0.001744	1.501
Within (Error)	24	0.02788	0.001162	
Total	29	0.0366		
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	0.2536	0.2536		
2	27 %	0.2574	0.2574	-0.1763	
3	37 %	0.2316	0.2316	1.02	
4	49 %	0.2492	0.2492	0.2041	
5	65 %	0.214	0.214	1.837	
6	87 %	0.2184	0.2184	1.633	
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	0.05088	20.1	-0.0038
3	37 %	5	0.05088	20.1	0.022
4	49 %	5	0.05088	20.1	0.0044
5	65 %	5	0.05088	20.1	0.0396
6	87 %	5	0.05088	20.1	0.0352

Appendix A2: Statistics

*Ceriodaphnia dubia* Survival

Fisher's Exact Test			
Identification	Alive	Dead	Total Animals
Control	10	0	10
27 %	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
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	1	
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
<p>D = 0.1821 D* = 1.429 Critical D* = 1.035 (alpha = 0.01, N = 60)</p> <p>Data FAIL normality test (alpha = 0.01).</p>	

Steel's Many-One Rank Test					No Transformation
Ho:Control<Treatment					
Group	Identification	Rank Sum	Critical Value	DF	Sig 0.05
1	Control				
2	27 %	146.50	75.00	10.00	
3	37 %	152.50	75.00	10.00	
4	49 %	146.50	75.00	10.00	
5	65 %	154.00	75.00	10.00	
6	87 %	155.00	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	926.5	185.3	12.61	
Within (Error)	53	778.5	14.69		
Total	58	1705			
Critical F = 3.39 (alpha = 0.01, df = 5,53)					
2.39 (alpha = 0.05, df = 5,53)					
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	22.7	22.7			
2	27 %	32.778	32.778	-5.723		
3	37 %	33.2	33.2	-6.126		
4	49 %	30	30	-4.259		
5	65 %	33.2	33.2	-6.126		
6	87 %	34.2	34.2	-6.709		
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 %	9	4.068	17.9	-10.08	
3	37 %	10	3.959	17.4	-10.5	
4	49 %	10	3.959	17.4	-7.3	
5	65 %	10	3.959	17.4	-10.5	
6	87 %	10	3.959	17.4	-11.5	

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: May 13, 2014 at 0908

Date and Time Test Terminated: May 20, 2014 at 1330

Effluent Conc.: Control	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
DO, mg/l	Initial	7.7	8.0	8.3	7.7	8.2	7.6	8.3
	Final *1	7.1	7.0	7.8	6.7	7.4	7.7	7.2
	Final *2	7.9	7.7	7.8	7.9	8.0	8.0	8.3
pH, units	Initial	7.5	7.1	7.2	7.2	7.4	7.3	7.2
	Final *1	7.2	7.2	7.5	6.8	7.1	7.2	7.0
	Final *2	7.4	7.8	7.3	7.5	7.2	7.1	7.5
Alkalinity, mg CaCO3/l	62	NA	62	NA	62	NA	NA	
Hardness, mg CaCO3/l	43	NA	42	NA	46	NA	NA	
Conductivity, umhos/cm	170	150	150	160	150	160	150	
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	7.6	8.0	8.3	7.5	8.4	7.9	8.4
	Final *1	7.2	6.9	7.7	6.4	7.5	7.7	6.9
	Final *2	7.9	7.8	7.8	8.0	7.9	8.2	8.2
pH, units	Initial	7.8	7.5	7.4	7.5	7.4	7.4	7.3
	Final *1	7.6	7.5	7.8	7.1	7.5	7.4	7.2
	Final *2	7.7	8.1	7.6	7.9	7.3	7.4	7.6

Effluent Conc.: 37 %	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
DO, mg/l	Initial	7.6	7.8	8.0	7.6	8.4	7.5	8.4
	Final *1	7.2	6.8	7.7	6.4	7.5	7.9	6.9
	Final *2	8.0	7.8	7.9	8.1	8.1	7.8	8.3
pH, units	Initial	7.8	7.6	7.6	7.6	7.3	7.4	7.4
	Final *1	7.7	7.6	7.9	7.2	7.6	7.5	7.3
	Final *2	7.8	8.2	7.7	7.9	7.4	7.4	7.7



Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: May 13, 2014 at 0908

Date and Time Test Terminated: May 20, 2014 at 1330

Effluent Conc.: 49 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.6	7.8	8.1	7.6	8.8	7.8	8.2
	Final *1	7.2	7.2	7.9	7.1	7.4	7.8	7.4
	Final *2	7.9	7.7	8.0	7.9	8.1	8.2	8.3
pH, units	Initial	7.8	7.7	7.6	7.7	7.4	7.5	7.4
	Final *1	7.9	7.8	8.0	7.5	7.8	7.6	7.5
	Final *2	7.9	8.3	7.8	8.0	7.4	7.5	7.7

Effluent Conc.: 65 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.5	7.9	8.1	7.5	9.0	7.6	8.3
	Final *1	7.3	7.0	7.9	6.9	7.4	7.6	7.2
	Final *2	7.9	7.7	8.0	8.0	8.0	8.0	8.0
pH, units	Initial	7.9	7.8	7.6	7.8	7.3	7.5	7.4
	Final *1	8.0	7.9	8.2	7.6	7.8	7.7	7.5
	Final *2	8.0	8.3	7.8	8.1	7.5	7.5	7.8
Alkalinity, mg CaCO <sub>3</sub> /l	99	NA	100	NA	55	NA	NA	NA
Hardness, mg CaCO <sub>3</sub> /l	100	NA	110	NA	73	NA	NA	NA
Conductivity, umhos/cm	330	310	310	320	220	230	250	250
Res. Chlorine, mg/l	<0.05	NA	<0.05	NA	<0.05	NA	NA	NA

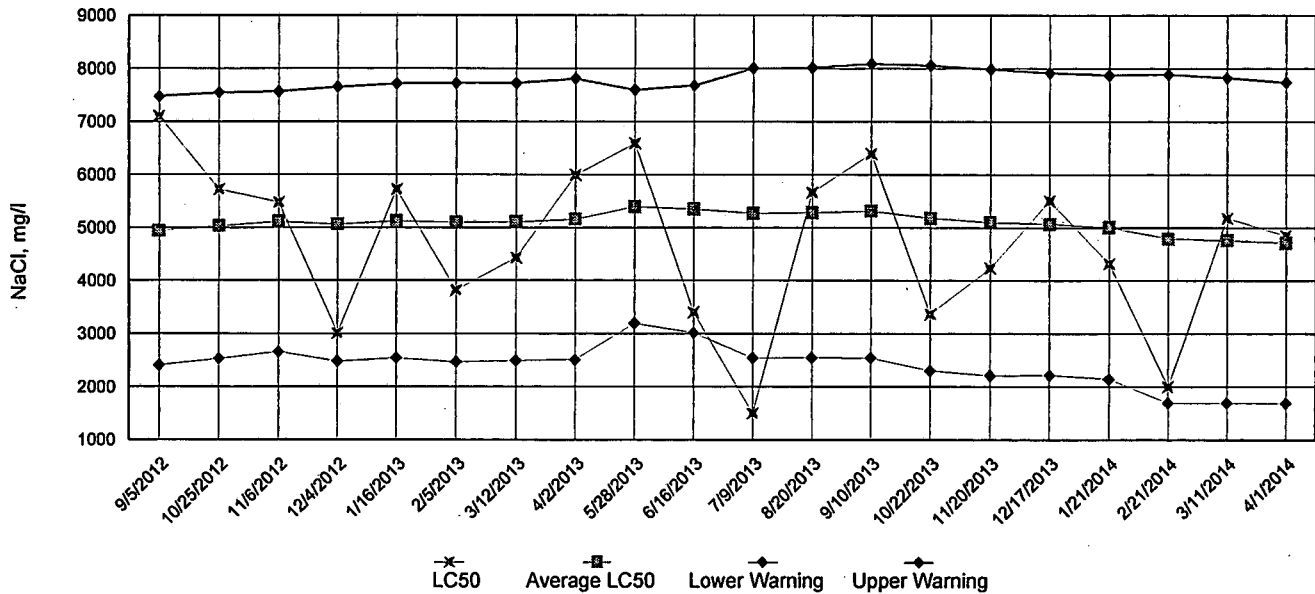
Effluent Conc.: 87 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.7	7.8	8.1	7.6	8.6	7.5	8.3
	Final *1	6.8	6.8	7.9	6.7	7.3	8.2	7.2
	Final *2	8.0	7.8	7.9	8.0	8.0	8.2	8.2
pH, units	Initial	7.9	8.0	7.7	7.9	7.4	7.6	7.4
	Final *1	7.9	8.0	8.3	7.6	7.9	7.9	7.6
	Final *2	8.1	8.4	7.9	8.2	7.6	7.6	7.8

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

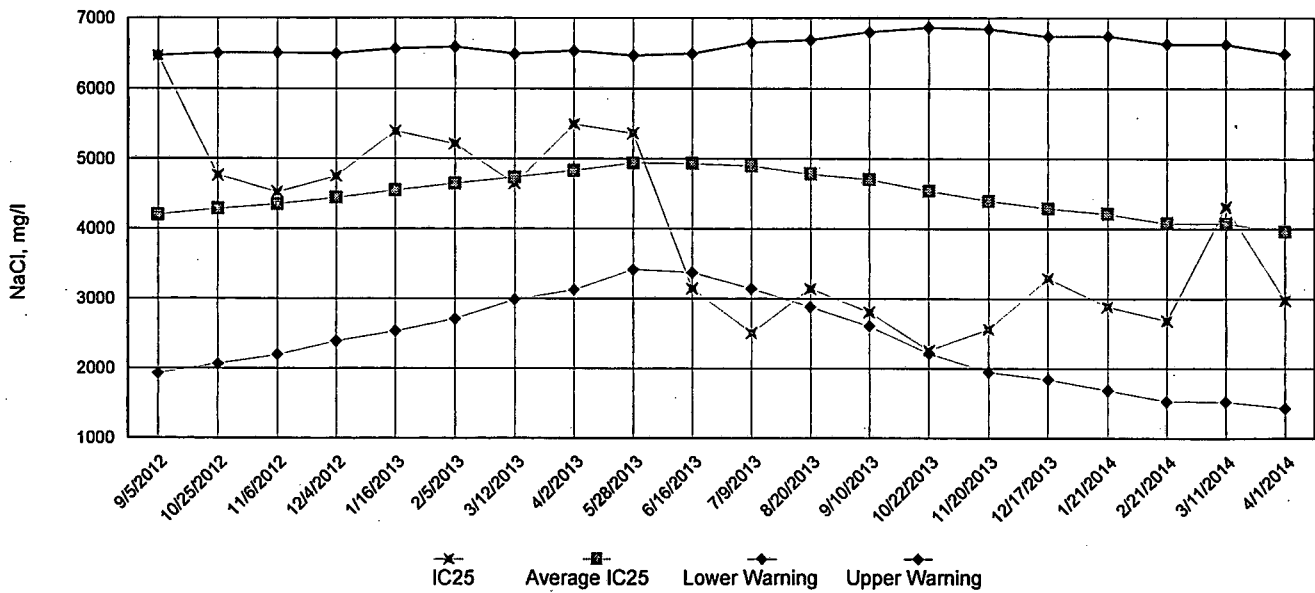
Appendix A4: Test 1000.0

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

LC50 Survival Data

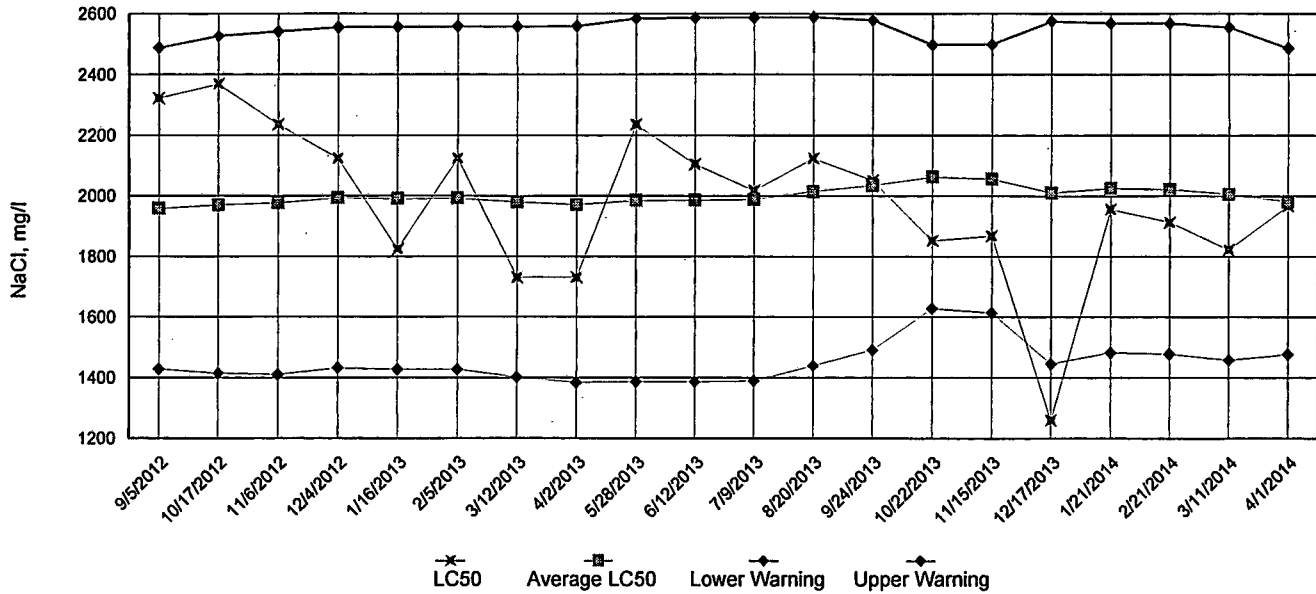


IC25 Growth Data

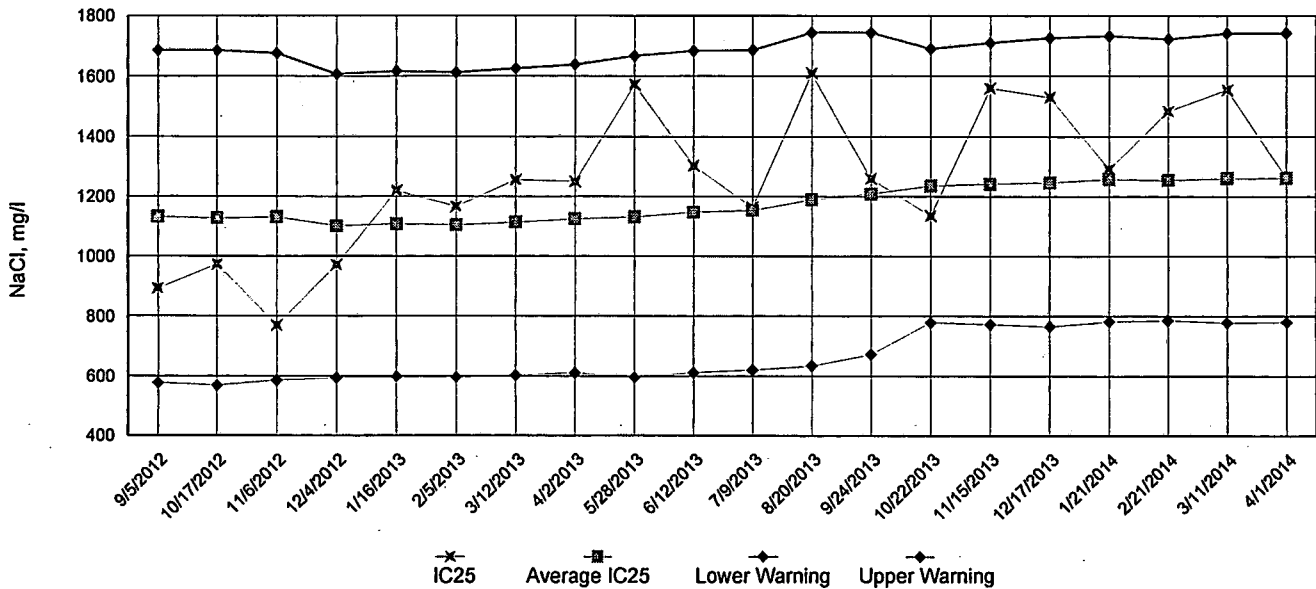


Appendix A4: Test 1002.0  
Chronic Reference Toxicant, *Ceriodaphnia dubia*

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: May 13, 2014 at 1350

Date and Time Test Terminated: May 20, 2014 at 1230

Dilution water used: Synthetic Soft Water #4098

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	100	100	100	100	100	100	0.00
37 %	100	87.5	75.0	100	100	100	100	92.5	12.1
49 %	100	100	100	100	87.5	100	100	97.5	5.73
65 %	100	100	100	100	100	100	100	100	0.00
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	0.235	0.255	0.265	0.261	0.252	0.254	4.56
27 %	0.248	0.248	0.259	0.258	0.274	0.257	4.14
37 %	0.229	0.185	0.200	0.254	0.290	0.232	18.2
49 %	0.235	0.262	0.288	0.236	0.225	0.249	10.3
65 %	0.160	0.276	0.278	0.198	0.158	0.214	27.9
87 %	0.205	0.180	0.231	0.251	0.225	0.218	12.4

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 %)	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<input type="checkbox"/> YES	<input type="checkbox"/> 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 %)	<input type="checkbox"/> YES	<input checked="" type="checkbox"/> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<input type="checkbox"/> YES	<input type="checkbox"/> 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: 27.9 (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, 307, 310

2400  
2400  
2400

Test Initiated: DATE: May 13, 2014 TIME: 1350  
Test Terminated: DATE: May 20, 2014 TIME: 1230

DILUTION Control	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.7	8.0	8.3	7.7	8.2	7.6	8.3
Final	7.1	7.0	7.8	6.7	7.4	7.7	7.2
pH Initial	7.5	7.1	7.2	7.2	7.4	7.3	7.2
Final	7.2	7.2	7.5	6.8	7.1	7.2	7.0
Alkalinity	62	NA	62	NA	62	NA	NA
Hardness	43	NA	42	NA	46	NA	NA
Conductivity	170	150	150	160	150	160	150
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 27 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.6	8.0	8.3	7.5	8.4	7.9	8.4
Final	7.2	6.9	7.7	6.4	7.5	7.7	6.9
pH Initial	7.8	7.5	7.4	7.5	7.4	7.4	7.3
Final	7.6	7.5	7.8	7.1	7.5	7.4	7.2
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	240	220	220	230	180	190	180
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 37 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.6	7.8	8.0	7.6	8.4	7.5	8.4
Final	7.2	6.8	7.7	6.4	7.5	7.9	6.9
pH Initial	7.8	7.6	7.6	7.6	7.3	7.4	7.4
Final	7.7	7.6	7.9	7.2	7.6	7.5	7.3
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	260	240	240	250	190	200	200
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 49 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.6	7.8	8.1	7.6	8.8	7.8	8.2
Final	7.2	7.2	7.9	7.1	7.4	7.8	7.4
pH Initial	7.8	7.7	7.6	7.7	7.4	7.5	7.4
Final	7.9	7.8	8.0	7.5	7.8	7.6	7.5
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	290	270	270	280	200	210	210
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 65 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.5	7.9	8.1	7.5	9.0	7.6	8.3
Final	7.3	7.0	7.9	6.9	7.4	7.6	7.2
pH Initial	7.9	7.8	7.6	7.8	7.3	7.5	7.4
Final	8.0	7.9	8.2	7.6	7.8	7.7	7.5
Alkalinity	99	NA	100	NA	55	NA	NA
Hardness	100	NA	110	NA	73	NA	NA
Conductivity	330	310	310	320	220	230	250
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 87 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.7	7.8	8.1	7.6	8.6	7.5	8.3
Final	6.8	6.8	7.9	6.7	7.3	8.2	7.2
pH Initial	7.9	8.0	7.7	7.9	7.4	7.6	7.4
Final	7.9	8.0	8.3	7.6	7.9	7.9	7.6
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	390	370	370	370	250	260	220
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: May 13, 2014 at 1130

Date and Time Test Terminated: May 20, 2014 at 1330

Dilution water used: Synthetic Soft Water #4098

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
7 day	100	90.0	100	100	100	100

NUMBER OF YOUNG PRODUCED PER FEMALE @ 7 DAYS

Replicates	Control	Percent Effluent				
		27 %	37 %	49 %	65 %	87 %
A	24	32	33	30	34	37
B	22	33	36	19	34	29
C	24	36	30	34	32	33
D	14	34	34	32	34	37
E	25	34	32	33	33	30
F	27	31	25	32	36	33
G	23	33	37	32	32	35
H	19	28	28	29	31	38
I	27	19	45	30	39	34
J	22	34	32	29	27	36
Mean per Adult	22.7	31.4	33.2	30.0	33.2	34.2
Mean per Surviving Adult	22.7	32.8	33.2	30.0	33.2	34.2
CV %	17.1	6.95	16.5	14.1	9.50	8.80

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

2. Steel's Many-One Rank Test:

Is the mean number of young produced per female significantly different ( $p=0.05$ ) than the control's number of young per female for the % effluent corresponding to (significant non-lethal effects):

a.) LOW FLOW OR CRITICAL DILUTION	(65 %)	_____ YES	<u>  X  </u> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	_____ YES	_____ NO

3. If you answered NO to 1.a) enter [0] otherwise enter [1]:   0   (TLP3B)
4. If you answered NO to 2.a) enter [0] otherwise enter [1]:   0   (TGP3B)
5. NOEC *Ceriodaphnia* Lethality:   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:   17.1   (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, 307, 310

2400  
2400  
2400

Test Initiated: DATE: May 13, 2014 TIME: 1130  
Test Terminated: DATE: May 20, 2014 TIME: 1330

DILUTION	DAY						
	1	2	3	4	5	6	7
Control							
D.O. Initial	7.7	8.0	8.3	7.7	8.2	7.6	8.3
Final	7.9	7.7	7.8	7.9	8.0	8.0	8.3
pH Initial	7.5	7.1	7.2	7.2	7.4	7.3	7.2
Final	7.4	7.8	7.3	7.5	7.2	7.1	7.5
Alkalinity	62	NA	62	NA	62	NA	NA
Hardness	43	NA	42	NA	46	NA	NA
Conductivity	170	150	150	160	150	160	150
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
27 %							
D.O. Initial	7.6	8.0	8.3	7.5	8.4	7.9	8.4
Final	7.9	7.8	7.8	8.0	7.9	8.2	8.2
pH Initial	7.8	7.5	7.4	7.5	7.4	7.4	7.3
Final	7.7	8.1	7.6	7.9	7.3	7.4	7.6
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	240	220	220	230	180	190	180
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
37 %							
D.O. Initial	7.6	7.8	8.0	7.6	8.4	7.5	8.4
Final	8.0	7.8	7.9	8.1	8.1	7.8	8.3
pH Initial	7.8	7.6	7.6	7.6	7.3	7.4	7.4
Final	7.8	8.2	7.7	7.9	7.4	7.4	7.7
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	260	240	240	250	190	200	200
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
49 %							
D.O. Initial	7.6	7.8	8.1	7.6	8.8	7.8	8.2
Final	7.9	7.7	8.0	7.9	8.1	8.2	8.3
pH Initial	7.8	7.7	7.6	7.7	7.4	7.5	7.4
Final	7.9	8.3	7.8	8.0	7.4	7.5	7.7
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	290	270	270	280	200	210	210
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
65 %							
D.O. Initial	7.5	7.9	8.1	7.5	9.0	7.6	8.3
Final	7.9	7.7	8.0	8.0	8.0	8.0	8.0
pH Initial	7.9	7.8	7.6	7.8	7.3	7.5	7.4
Final	8.0	8.3	7.8	8.1	7.5	7.5	7.8
Alkalinity	99	NA	100	NA	55	NA	NA
Hardness	100	NA	110	NA	73	NA	NA
Conductivity	330	310	310	320	220	230	250
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
87 %							
D.O. Initial	7.7	7.8	8.1	7.6	8.6	7.5	8.3
Final	8.0	7.8	7.9	8.0	8.0	8.2	8.2
pH Initial	7.9	8.0	7.7	7.9	7.4	7.6	7.4
Final	8.1	8.4	7.9	8.2	7.6	7.6	7.8
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	390	370	370	370	250	260	220
Chlorine	NA	NA	NA	NA	NA	NA	NA







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

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NPDES Enforcement Section  
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North Little Rock, AR 72118-5317