

Sanitary Sewer Overflow (SSO) Monthly Report


Utility Name: Hot Springs Wastewater NPDES Permit No.: AR0033880 Monitoring Period (Month/Year) October / 2012

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
HC-Hydro Clean	LF-Line Failure	EFK-Evidence of Fish Kill	DI-Ditch
R-Rainfall	RG-Roots/Grease	HR-Hand Rodded	DR-Drop Inlet
RO-Roots	V-Vandalism	EN-Referred to Engineering	GR-Ground Surface
		PN-Public Notification	PA-Paved Area
			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
Grand Ave & Rugg St	Manhole # 436	10/30/2012	10/30/2012	1500	RG	NEAH	HC	PA & DR


Signature of Cognizant or Ranking Official

11-16-12
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 significant penalties for submitting false information, including the possibility of fine and imprisonment of knowing violations.

CONFIRMATION NUMBER

BC1997A5-A8A4-4891-A9D0-6FBE61C4AE37

(NOTE: You will need this number should you ever need to contact ADEQ concerning this report)

The following information has been sent.

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24-Hour Sanitary Sewer Overflow Report

SSO ID#: BC1997A5-A8A4-4891-A9D0-6FBE61C4AE37

Date Sent: 10/30/2012

SSO Bypass Upset

Facility Permit Number: **AR0033880**

Facility name:

Hot Springs Wastewater

Date Overflow Began: **10/30/2012**

Time:

7:30 am

Date Overflow Ended: **10/30/2012**

Time:

8:30 am

Location:

Grand Ave & Rugg St Manhole # 436 overflowed into Storm Sewer

(Give address, manhole number-if numbered. Include where the overflow went-yard, ditch, stream, storm sewer, building, other).

Type of Overflow

- Manhole Overflow
- Lift Station Overflow
- Main Line Overflow
- Service Line Overflow
- <=""> Other Overflow Type:

(Enter overflow type if not listed)

Cause of Overflow

- I & I - Rainfall
- Roots
- Grease
- Debris
- Equipment Failure
- Construction
- Vandalism
- Power Failure
- Line Failure/Break
- Other Cause:

Volume:

15000

(Give an estimate in gallons)

Impact of SSO Event:

SSO Reached Receiving Water (river,stream)

Action Taken - Check all that apply

(Short term and long-term action, including clean-up and any plans to remediate I & I).

- Machine rodded
- Jet-Vac
- Hand rodded
- Used Generator To Power Pumps/Equipment
- Other: Describe
- Disinfected and Deodorized
- Hydro Cleaned
- Spread Lime on Affected Area
- Public Notification

Environmental Damage

- OEHC - Observed or Evidence of Human Contact
- NEAH - No Evidence of Adverse Health/Environmental Impact
- OEEI - Observed or Evidence of Environmental Impact
- EFK - Evidence of Fish Kill

Reported By **Shawn Davis** Title **Sewer Collection Manager** Telephone Number **(501) 623-6981**

Additional Comments if Needed:

August 16, 2012

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

Control No. 159927-1

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



August 16, 2012
Control No. 159927-1
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 %. 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

A handwritten signature in black ink, appearing to read 'John Overbey', is written over a horizontal line.

John Overbey
Laboratory Director

PDF cc: City of Hot Springs
ATTN: Mr. Ron Wacaster
rwacaster@cityhs.net

City of Hot Springs
ATTN: Ms. Linda Black
lblack@cityhs.net

Table of Contents

- I. Control Acceptance Criteria
- II. Outlined Report
- III. Data Analysis
- IV. Standard Reference Toxicants
- V. Chemical Analysis/Quality Control
- VI. Organism History
- VII. Results Summary
 - Pimephales promelas* (Fathead minnow)
 - Ceriodaphnia dubia*

Appendix A: Raw Data

A1: Test 1000.0

Pimephales promelas (Fathead minnow) Survival and Growth

Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

A2: Statistics

A3: Water Chemistry

A4: Reference Toxicant

Appendix B: Chains of Custody

I. Control Acceptance Criteria

Pimephales promelas (Fathead minnow) Method 1000.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	95.0	PASS
Control Growth > or = 0.25 mg per Surviving minnow	0.543	PASS
Control Growth CV < or = 40%	8.94	PASS
Growth Minimum Significant Difference 12 to 30%	14.5	PASS
Critical Dilution CV < or = 40%	8.68	PASS

Ceriodaphnia dubia Method 1002.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	100	PASS
Control Reproduction > or = 15 per Surviving Female	21.1	PASS
Control CV < or = 40% per Surviving Female	14.2	PASS
Reproduction Minimum Significant Difference 13 to 47%	12.7	BELOW
Critical Dilution CV < or = 40%	13.6	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)	8.0	8.4	8.0
pH (standard units)	7.6	7.7	8.2
Alkalinity (mg/l as CaCO ₃)	53	48	48
Hardness (mg/l as CaCO ₃)	84	79	85
Conductivity (umhos/cm)	400	430	400
Residual Chlorine (mg/l)	<0.05	<0.05	<0.05
Ammonia as N (mg/l)	<0.1	<0.1	0.46

2. Dilution Water Samples: Synthetic Soft Water #3897
 - a. Dates Prepared: August 1 through August 15, 2012
 - b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	8.0	7.6	8.0
pH (standard units)	7.8	7.7	7.7
Alkalinity (mg/l as CaCO ₃)	30	30	30
Hardness (mg/l as CaCO ₃)	45	43	47
Conductivity (umhos/cm)	170	180	160
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: August 7, 2012 at 0930
Date & Time Test Terminated: August 14, 2012 at 1100
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: August 7, 2012 at 1030
Date & Time Test Terminated: August 14, 2012 at 1210
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	99.6	4.01
pH	SM 4500-H+ B	101	0.537
Conductivity	EPA 120.1	90.5	7.94

VI. Organism History

Pimephales promelas (Fathead minnow)

Date: August 7, 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: August 7, 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

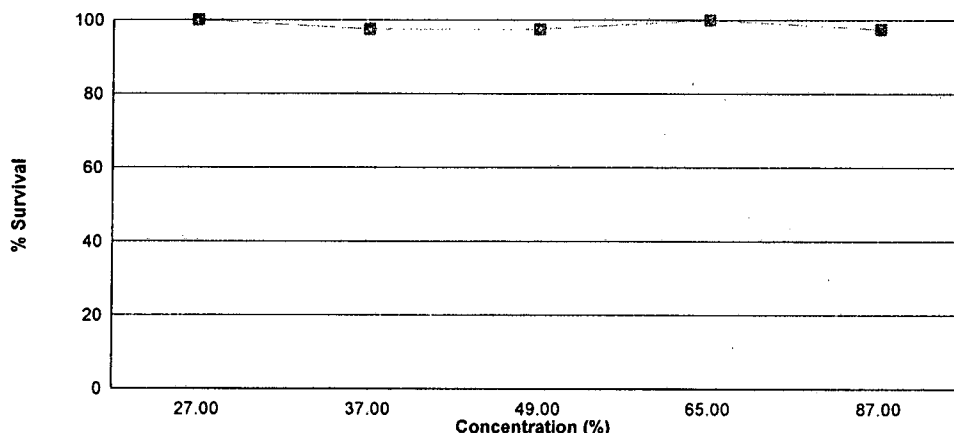
Larvae are exposed in a static renewal system for seven days to different concentrations of effluent with dilution water. Test results are based on the survival and growth (increase in weight) of the larvae.

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 August 7, 2012 at 0930 and continued through August 14, 2012 at 1100. 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	95.0	0.516
27 %	100	0.572
37 %	97.5	0.575
49 %	97.5	0.550
65 %	100	0.563
87 %	97.5	0.601

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

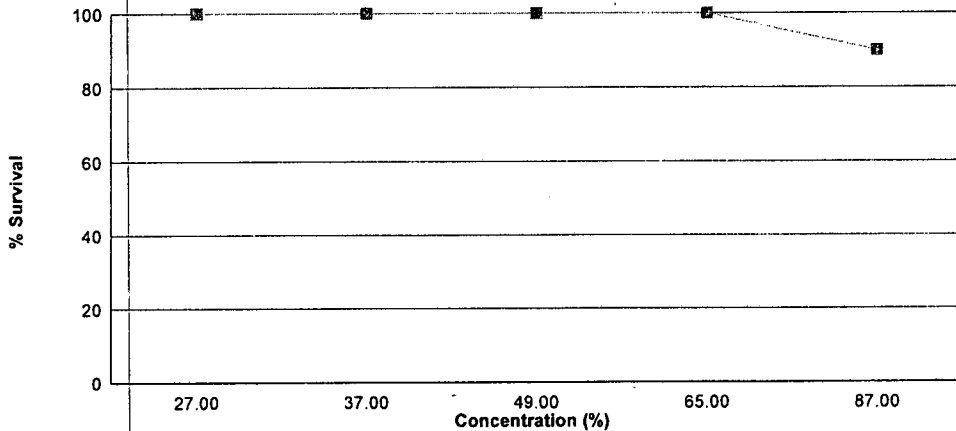
Neonates are exposed in a static renewal system to different concentrations of effluent with dilution water until 60% of surviving control organisms have three broods of offspring with an average of at least 15 young per female.

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 August 7, 2012 at 1030 and continued through August 14, 2012 at 1210. 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 7-day <i>Ceriodaphnia dubia</i> Survival and Reproduction Data		
Concentration	Percent Survival	Mean Reproduction
Control	100	21.1
27 %	100	21.3
37 %	100	21.0
49 %	100	19.6
65 %	100	19.3
87 %	90.0	17.9

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Survival

Date and Time Test Initiated: August 7, 2012 at 0930
Date and Time Test Terminated: August 14, 2012 at 1100

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	6	6	6	6	6	6	6
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	7	7	7	7	7
	C	8	8	8	8	8	8	8
	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	7	7	7	7
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
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	7	7	7	7
	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: August 7, 2012 at 0930
Test Terminated: August 14, 2012 at 1100

Drying Started: August 13, 2012 at 1320
Drying Ended: August 15, 2012 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	.93760	.94129	0.00369	8	0.461
	B	.93949	.94395	0.00446	8	0.558
	C	.93807	.94202	0.00395	8	0.494
	D	.93918	.94374	0.00456	8	0.570
	E	.94859	.95257	0.00398	8	0.498
27 %	A	.94797	.95244	0.00447	8	0.559
	B	.94756	.95225	0.00469	8	0.586
	C	.94139	.94560	0.00421	8	0.526
	D	.94583	.95083	0.00500	8	0.625
	E	.94492	.94944	0.00452	8	0.565
37 %	A	.93864	.94251	0.00387	8	0.484
	B	.94002	.94488	0.00486	8	0.608
	C	.93944	.94382	0.00438	8	0.548
	D	.93980	.94464	0.00484	8	0.605
	E	.93896	.94400	0.00504	8	0.630
49 %	A	.94042	.94507	0.00465	8	0.581
	B	.93943	.94317	0.00374	8	0.468
	C	.93946	.94345	0.00399	8	0.499
	D	.93814	.94262	0.00448	8	0.560
	E	.93822	.94336	0.00514	8	0.642
65 %	A	.93685	.94186	0.00501	8	0.626
	B	.93660	.94109	0.00449	8	0.561
	C	.94201	.94633	0.00432	8	0.540
	D	.93942	.94340	0.00398	8	0.498
	E	.93852	.94326	0.00474	8	0.592
87 %	A	.94087	.94527	0.00440	8	0.550
	B	.94330	.94810	0.00480	8	0.600
	C	.94467	.94964	0.00497	8	0.621
	D	.94389	.94870	0.00481	8	0.601
	E	.94469	.94974	0.00505	8	0.631

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: August 7, 2012 at 1030
Date and Time Test Terminated: August 14, 2012 at 1210

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	2	3	3	1	2	1	4	2	4	2	24	10	2.40	
5	7	6	0	1	0	0	7	5	0	0	26	10	2.60	
6	0	0	7	7	7	6	0	0	7	6	40	10	4.00	
7	11	13	11	14	13	10	14	9	14	12	121	10	12.1	
8														
TOTAL	20	22	21	23	22	17	25	16	25	20	211	10	21.1	

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	0	0	0	0	0	0	0	10	0.00	
4	3	2	2	2	2	3	4	2	3	2	25	10	2.50	
5	7	6	6	0	0	0	6	0	0	0	25	10	2.50	
6	0	0	0	9	7	7	0	7	7	6	43	10	4.30	
7	14	13	11	11	11	14	10	12	12	12	120	10	12.0	
8														
TOTAL	24	21	19	22	20	24	20	21	22	20	213	10	21.3	

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	0	0	0	0	0	0	0	0	0	0	0	10	0.00	
4	3	3	2	2	3	2	3	2	5	3	28	10	2.80	
5	6	6	0	0	0	0	6	0	0	0	18	10	1.80	
6	0	0	6	7	7	4	0	9	6	6	45	10	4.50	
7	14	12	11	10	13	11	11	12	12	13	119	10	11.9	
8														
TOTAL	23	21	19	19	23	17	20	23	23	22	210	10	21.0	

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: August 7, 2012 at 1030
Date and Time Test Terminated: August 14, 2012 at 1210

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	3	0	3	2	2	2	3	2	3	0	20	10	2.00	
5	6	5	0	0	0	0	6	1	0	7	25	10	2.50	
6	0	8	6	6	9	7	0	6	9	7	58	10	5.80	
7	11	0	13	12	11	12	11	11	12	0	93	10	9.30	
8														
TOTAL	20	13	22	20	22	21	20	20	24	14	196	10	19.6	

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	3	2	2	1	2	2	3	2	0	3	20	10	2.00	
5	5	6	0	0	0	0	8	0	6	0	25	10	2.50	
6	0	0	7	8	7	7	0	4	7	7	47	10	4.70	
7	11	12	12	10	10	11	12	12	0	11	101	10	10.1	
8														
TOTAL	19	20	21	19	19	20	23	18	13	21	193	10	19.3	

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	2	2	2	2	2	2	2	2	4	3	23	10	2.30	
5	6	5	0	0	6	0	X	0	0	0	17	9	1.89	
6	0	0	6	7	0	6	X	7	7	7	40	9	4.44	
7	11	12	11	10	11	11	X	10	12	11	99	9	11.0	
8														
TOTAL	19	19	19	19	19	19	2	19	23	21	179	10	17.9	

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	0.75000	1.04720
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	1.00000	1.39310
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	0.87500	1.20940
4	49 %	4	1.00000	1.39310
4	49 %	5	1.00000	1.39310
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	0.87500	1.20940
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 = 0.1767 W = 0.6823 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 %	30.00	16.00	5.00	
3	37 %	28.00	16.00	5.00	
4	49 %	28.00	16.00	5.00	
5	65 %	30.00	16.00	5.00	
6	87 %	28.00	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 = 0.06019 W = 0.979 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 = 2.995 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	0.02001	0.004002	1.596	
Within (Error)	24	0.06019	0.002508		
Total	29	0.0802			
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	0.5162	0.5162		
2	27 %	0.5722	0.5722	-1.768	
3	37 %	0.575	0.575	-1.856	
4	49 %	0.55	0.55	-1.067	
5	65 %	0.5634	0.5634	-1.49	
6	87 %	0.6006	0.6006	-2.665	
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	0.07475	14.5	-0.056
3	37 %	5	0.07475	14.5	-0.0588
4	49 %	5	0.07475	14.5	-0.0338
5	65 %	5	0.07475	14.5	-0.0472
6	87 %	5	0.07475	14.5	-0.0844

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 %	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.

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	1	

Appendix A2: Statistics

Ceriodaphnia dubia Reproduction

Chi-Square Test for Normality	No Transformation
Chi-Square = 8.0878 Critical Chi-Square = 13.28	(alpha = 0.01, df = 4)
Data PASS normality test (alpha = 0.01).	

Kolmogorov Test for Normality	No Transformation
D = 0.1808 D* = 1.419 Critical D* = 1.035	(alpha = 0.01, N = 60)
Data FAIL normality test (alpha = 0.01).	

Steel's Many-One Rank Test				No Transformation	
Ho:Control<Treatment					
Group	Identification	Rank Sum	Critical Value	DF	Sig 0.05
1	Control				
2	27 %	103.00	75.00	10.00	
3	37 %	104.00	75.00	10.00	
4	49 %	91.50	75.00	10.00	
5	65 %	85.50	75.00	10.00	
6	87 %	81.00	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	39.72	7.944	1.255	
Within (Error)	53	335.5	6.33		
Total	58	375.2			
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	21.1	21.1			
2	27 %	21.3	21.3	-0.1778		
3	37 %	21	21	0.08888		
4	49 %	19.6	19.6	1.333		
5	65 %	19.3	19.3	1.6		
6	87 %	19.667	19.667	1.24		
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	2.599	12.3	-0.2	
3	37 %	10	2.599	12.3	0.1	
4	49 %	10	2.599	12.3	1.5	
5	65 %	10	2.599	12.3	1.8	
6	87 %	9	2.67	12.7	1.433	

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: August 7, 2012 at 0814
Date and Time Test Terminated: August 14, 2012 at 1210

Effluent Conc.: Control		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.0	7.8	7.6	8.0	8.0	7.9	7.7
	Final *1	7.1	6.7	6.8	7.4	7.6	6.4	5.2
	Final *2	8.1	8.2	8.1	8.4	8.4	7.9	7.9
pH, units	Initial	7.8	7.9	7.7	7.8	7.7	7.9	7.8
	Final *1	7.6	7.4	7.5	7.8	7.9	7.6	6.8
	Final *2	8.0	8.0	8.2	8.3	8.4	8.4	7.7
Alkalinity, mg CaCO ₃ /l		30	NA	30	NA	30	NA	NA
Hardness, mg CaCO ₃ /l		45	NA	43	NA	47	NA	NA
Conductivity, umhos/cm		170	NA	180	NA	160	NA	NA
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	7.9	7.8	7.8	7.9	7.8	8.0	7.8
	Final *1	7.0	6.3	7.0	7.4	7.4	6.1	5.0
	Final *2	7.9	7.9	8.4	8.4	8.2	8.0	7.2
pH, units	Initial	7.7	7.8	7.5	7.7	7.6	7.8	7.5
	Final *1	7.6	7.4	7.5	7.8	8.0	7.6	6.8
	Final *2	8.1	8.0	8.2	8.4	8.4	8.4	7.6

Effluent Conc.: 37 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.8	7.9	8.0	7.9	7.7	7.6	7.6
	Final *1	7.4	6.1	6.9	7.4	7.5	6.2	4.8
	Final *2	8.2	8.0	8.2	8.2	8.2	8.0	7.6
pH, units	Initial	7.7	7.8	7.5	7.7	7.6	7.8	7.4
	Final *1	7.6	7.4	7.6	7.8	8.0	7.6	6.9
	Final *2	8.1	8.0	8.1	8.4	8.4	8.4	7.6

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: August 7, 2012 at 0814
Date and Time Test Terminated: August 14, 2012 at 1210

Effluent Conc.: 49 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.0	7.8	7.7	7.9	7.7	7.7	7.7
	Final *1	7.2	6.7	7.1	7.4	7.9	6.2	6.2
	Final *2	8.3	8.2	8.2	8.2	8.2	8.3	7.7
pH, units	Initial	7.7	7.8	7.5	7.7	7.6	7.9	7.4
	Final *1	7.7	7.6	7.6	7.9	8.1	7.7	7.2
	Final *2	8.2	8.0	8.2	8.3	8.4	8.4	7.7

Effluent Conc.: 65 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.0	7.8	8.1	7.2	7.9	7.7	7.6
	Final *1	7.3	6.7	7.1	7.5	7.7	6.6	5.6
	Final *2	8.1	8.1	8.1	8.4	8.1	8.3	7.7
pH, units	Initial	7.7	7.8	7.4	7.7	7.6	7.9	7.4
	Final *1	7.8	7.5	7.7	7.9	8.1	7.8	7.2
	Final *2	8.1	8.1	8.2	8.3	8.4	8.3	7.7
Alkalinity, mg CaCO ₃ /l		46	NA	49	NA	42	NA	NA
Hardness, mg CaCO ₃ /l		69	NA	65	NA	70	NA	NA
Conductivity, umhos/cm		320	NA	330	NA	340	NA	NA
Res. Chlorine, mg/l		<0.05	NA	<0.05	NA	<0.05	NA	NA

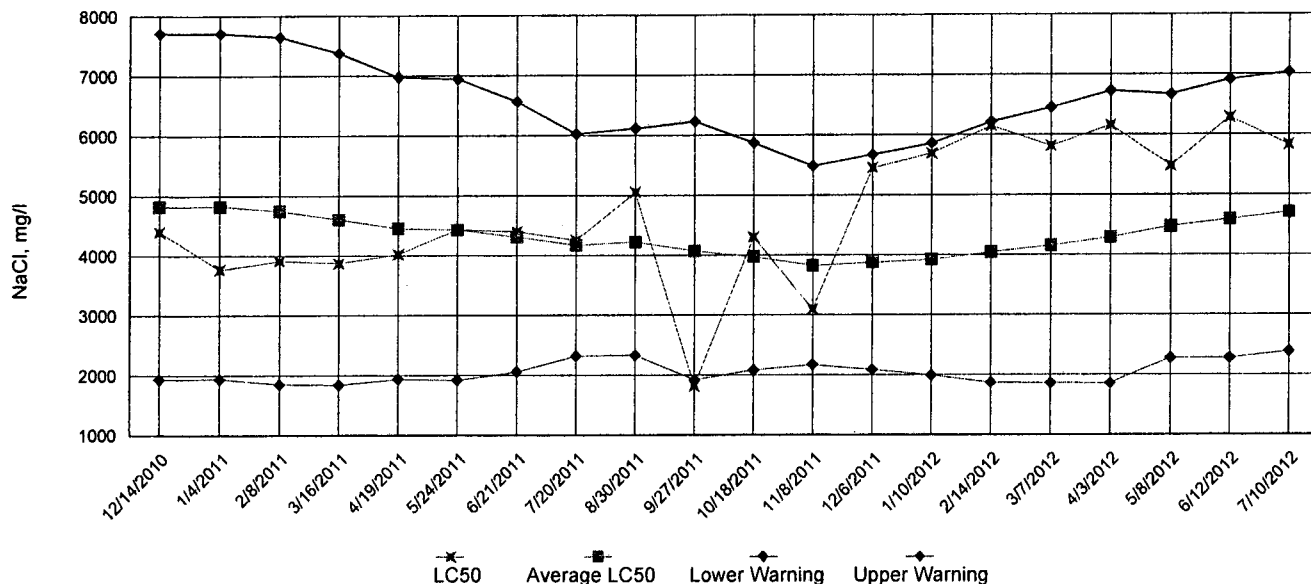
Effluent Conc.: 87 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.0	7.8	8.1	7.8	8.5	8.1	7.7
	Final *1	7.8	6.5	7.1	7.4	7.8	6.7	5.4
	Final *2	7.9	7.8	8.2	8.4	8.2	8.0	7.8
pH, units	Initial	7.6	7.8	7.4	7.6	7.4	7.9	7.3
	Final *1	7.8	7.6	7.7	8.0	8.2	7.9	7.3
	Final *2	8.2	8.1	8.2	8.4	8.5	8.4	7.8

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

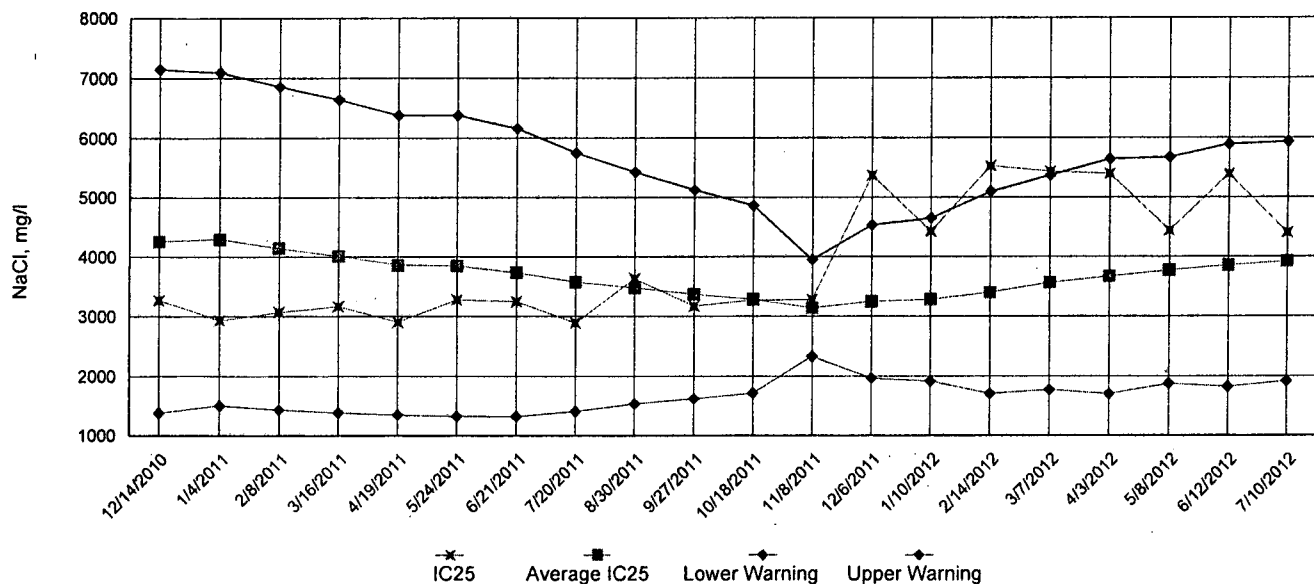
Appendix A4: Test 1000.0

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

LC50 Survival Data

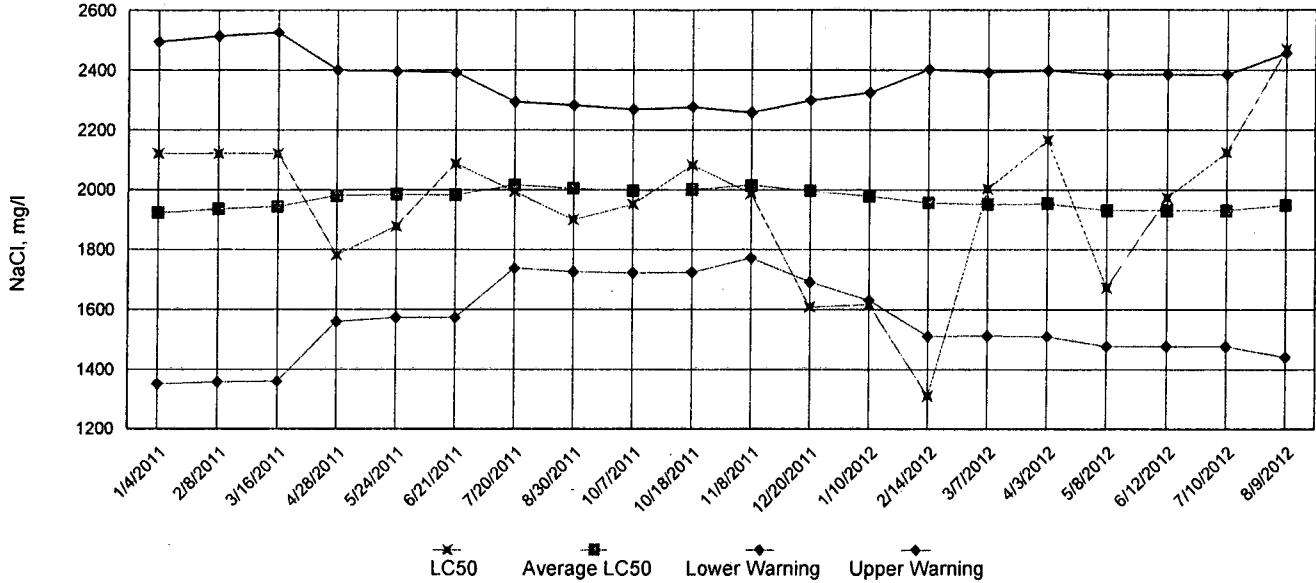


IC25 Growth Data

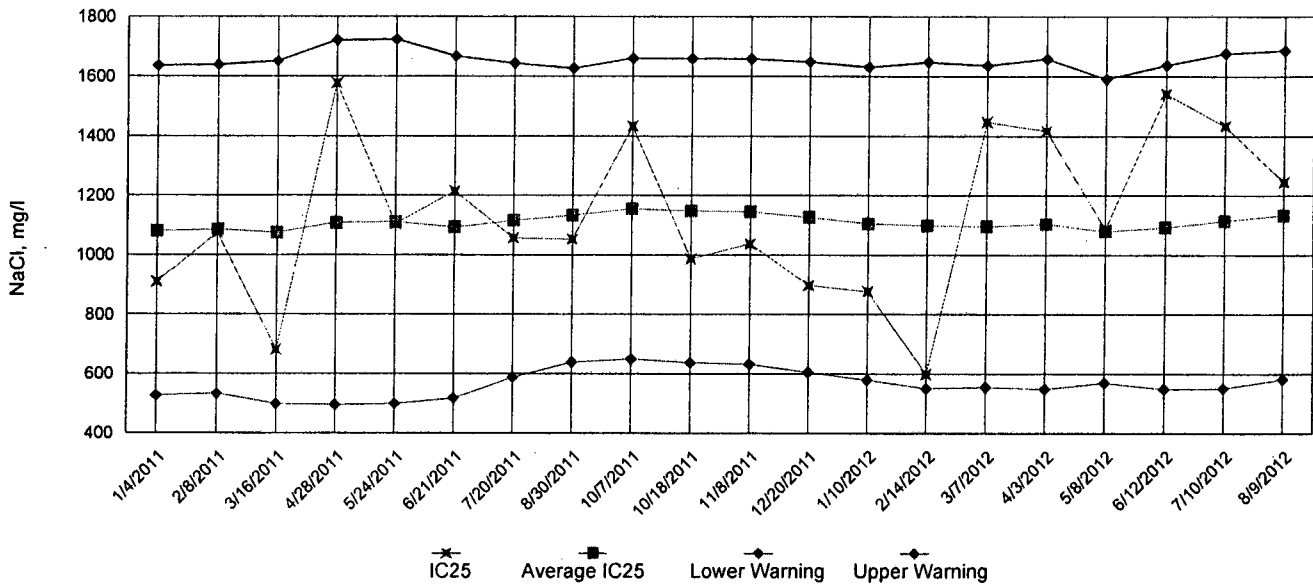


Appendix A4: Test 1002.0
Chronic Reference Toxicant, *Ceriodaphnia dubia*

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: August 7, 2012 at 0930

Date and Time Test Terminated: August 14, 2012 at 1100

Dilution water used: Synthetic Soft Water #3897

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	75.0	95.0	95.0	95.0	11.8
27 %	100	100	100	100	100	100	100	100	0.00
37 %	100	87.5	100	100	100	100	100	97.5	5.73
49 %	100	100	87.5	100	100	100	100	97.5	5.73
65 %	100	100	100	100	100	100	100	100	0.00
87 %	100	87.5	100	100	100	100	100	97.5	5.73

DATA TABLE FOR GROWTH

Effluent Conc. %	Average dry weight, mg replicate chambers					Mean dry weight, mg	CV%
	A	B	C	D	E		
Control	0.461	0.558	0.494	0.570	0.498	0.516	8.94
27 %	0.559	0.586	0.526	0.625	0.565	0.572	6.38
37 %	0.484	0.608	0.548	0.605	0.630	0.575	10.3
49 %	0.581	0.468	0.499	0.560	0.642	0.55	12.5
65 %	0.626	0.561	0.540	0.498	0.592	0.563	8.68
87 %	0.550	0.600	0.621	0.601	0.631	0.601	5.20

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]: | <u> 0 </u> | (TLP6C) |
| 4. If you answered NO to 2.a) enter [0] otherwise enter [1]: | <u> 0 </u> | (TGP6C) |
| 5. NOEC Pimephales Lethality: | <u> 87 % </u> | (TOP6C) |
| 6. LOEC Pimephales Lethality: | <u> 87 % </u> | (TXP6C) |
| 7. NOEC Pimephales Sublethality: | <u> 87 % </u> | (TPP6C) |
| 8. LOEC Pimephales Sublethality: | <u> 87 % </u> | (TYP6C) |
| 9. Coefficient of variation for Pimephales growth: | <u> 8.94 </u> | (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: August 7, 2012 TIME: 0930
Test Terminated: DATE: August 14, 2012 TIME: 1100

DILUTION Control	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	7.8	7.6	8.0	8.0	7.9	7.7
Final	7.1	6.7	6.8	7.4	7.6	6.4	5.2
pH Initial	7.8	7.9	7.7	7.8	7.7	7.9	7.8
Final	7.6	7.4	7.5	7.8	7.9	7.6	6.8
Alkalinity	30	NA	30	NA	30	NA	NA
Hardness	45	NA	43	NA	47	NA	NA
Conductivity	170	NA	180	NA	160	NA	NA
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 27 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.9	7.8	7.8	7.9	7.8	8.0	7.8
Final	7.0	6.3	7.0	7.4	7.4	6.1	5.0
pH Initial	7.7	7.8	7.5	7.7	7.6	7.8	7.5
Final	7.6	7.4	7.5	7.8	8.0	7.6	6.8
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	NA	NA	NA	NA	NA	NA	NA
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 37 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.8	7.9	8.0	7.9	7.7	7.6	7.6
Final	7.4	6.1	6.9	7.4	7.5	6.2	4.8
pH Initial	7.7	7.8	7.5	7.7	7.6	7.8	7.4
Final	7.6	7.4	7.6	7.8	8.0	7.6	6.9
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	NA	NA	NA	NA	NA	NA	NA
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 49 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	7.8	7.7	7.9	7.7	7.7	7.7
Final	7.2	6.7	7.1	7.4	7.9	6.2	6.2
pH Initial	7.7	7.8	7.5	7.7	7.6	7.9	7.4
Final	7.7	7.6	7.6	7.9	8.1	7.7	7.2
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	NA	NA	NA	NA	NA	NA	NA
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 65 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	7.8	8.1	7.2	7.9	7.7	7.6
Final	7.3	6.7	7.1	7.5	7.7	6.6	5.6
pH Initial	7.7	7.8	7.4	7.7	7.6	7.9	7.4
Final	7.8	7.5	7.7	7.9	8.1	7.8	7.2
Alkalinity	46	NA	49	NA	42	NA	NA
Hardness	69	NA	65	NA	70	NA	NA
Conductivity	320	NA	330	NA	340	NA	NA
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 87 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	7.8	8.1	7.8	8.5	8.1	7.7
Final	7.8	6.5	7.1	7.4	7.8	6.7	5.4
pH Initial	7.6	7.8	7.4	7.6	7.4	7.9	7.3
Final	7.8	7.6	7.7	8.0	8.2	7.9	7.3
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	NA	NA	NA	NA	NA	NA	NA
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: August 7, 2012 at 1030

Date and Time Test Terminated: August 14, 2012 at 1210

Dilution water used: Synthetic Soft Water #3897

PERCENT SURVIVAL

Time of Reading	Percent Effluent					
	Control	27 %	37 %	49 %	65 %	87 %
24 hour	100	100	100	100	100	100
48 hour	100	100	100	100	100	100
7 day	100	100	100	100	100	90.0

NUMBER OF YOUNG PRODUCED PER FEMALE @ 7 DAYS

Replicates	Percent Effluent					
	Control	27 %	37 %	49 %	65 %	87 %
A	20	24	23	20	19	19
B	22	21	21	13	20	19
C	21	19	19	22	21	19
D	23	22	19	20	19	19
E	22	20	23	22	19	19
F	17	24	17	21	20	19
G	25	20	20	20	23	2
H	16	21	23	20	18	19
I	25	22	23	24	13	23
J	20	20	22	14	21	21
Mean per Adult	21.1	21.3	21.0	19.6	19.3	17.9
Mean per Surviving Adult	21.1	21.3	21.0	19.6	19.3	19.7
CV %	14.2	8.00	10.3	17.7	13.6	7.19

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: 14.2 (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: August 7, 2012 TIME: 1030
Test Terminated: DATE: August 14, 2012 TIME: 1210

DILUTION Control	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	7.8	7.6	8.0	8.0	7.9	7.7
Final	8.1	8.2	8.1	8.4	8.4	7.9	7.9
pH Initial	7.8	7.9	7.7	7.8	7.7	7.9	7.8
Final	8.0	8.0	8.2	8.3	8.4	8.4	7.7
Alkalinity	30	NA	30	NA	30	NA	NA
Hardness	45	NA	43	NA	47	NA	NA
Conductivity	170	NA	180	NA	160	NA	NA
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 27 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.9	7.8	7.8	7.9	7.8	8.0	7.8
Final	7.9	7.9	8.4	8.4	8.2	8.0	7.2
pH Initial	7.7	7.8	7.5	7.7	7.6	7.8	7.5
Final	8.1	8.0	8.2	8.4	8.4	8.4	7.6
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	NA	NA	NA	NA	NA	NA	NA
Chlorine	NA	NA	NA	NA	NA	NA	NA

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

DILUTION 49 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	7.8	7.7	7.9	7.7	7.7	7.7
Final	8.3	8.2	8.2	8.2	8.2	8.3	7.7
pH Initial	7.7	7.8	7.5	7.7	7.6	7.9	7.4
Final	8.2	8.0	8.2	8.3	8.4	8.4	7.7
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	NA	NA	NA	NA	NA	NA	NA
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 65 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	7.8	8.1	7.2	7.9	7.7	7.6
Final	8.1	8.1	8.1	8.4	8.1	8.3	7.7
pH Initial	7.7	7.8	7.4	7.7	7.6	7.9	7.4
Final	8.1	8.1	8.2	8.3	8.4	8.3	7.7
Alkalinity	46	NA	49	NA	42	NA	NA
Hardness	69	NA	65	NA	70	NA	NA
Conductivity	320	NA	330	NA	340	NA	NA
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 87 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	7.8	8.1	7.8	8.5	8.1	7.7
Final	7.9	7.8	8.2	8.4	8.2	8.0	7.8
pH Initial	7.6	7.8	7.4	7.6	7.4	7.9	7.3
Final	8.2	8.1	8.2	8.4	8.5	8.4	7.8
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	NA	NA	NA	NA	NA	NA	NA
Chlorine	NA	NA	NA	NA	NA	NA	NA



CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

PAGE OF

Client: <u>Hot Springs Wastewater</u>			PO No. <u>12-2812</u>		NO OF BOTTLES	ANALYSES REQUESTED ¹ <u>Bio Monitoring</u>										AIC CONTROL NO: <u>159927</u>		
Project Reference:			<u>12-3054</u>													SAMPLE MATRIX		AIC PROPOSAL NO:
Project Manager: <u>James Sorrells</u>			G R A B	C O M P	W A T E R	S O I L	Carrier/Tracking No. _____										Received Temperature C <u>25</u>	
Sampled By: <u>AT</u>																	Remarks	
AIC No.	Sample Identification	Date/Time Collected																
<u>1</u>	<u>Plant Effluent</u>	<u>8-5-12 @ 0000-2400</u>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>													
Container Type			Preservative		Field pH calibration on _____ @ _____													
					Buffer:													
G = Glass			P = Plastic		V = VOA vials			H = HCl to pH2			T = Sodium Thiosulfate							
NO = none			S = Sulfuric acid pH2		N = Nitric acid pH2			B = NaOH to pH12			Z = Zinc acetate							
Turnaround Time Requested: (Please circle) <u>NORMAL</u> or EXPEDITED IN _____ DAYS					Relinquished By: <u>A. Thomson</u>		Date/Time: <u>8-6-12 @ 10:35</u>		Received By: <u>M. Mann</u>		Date/Time: <u>8-6-12 10:35am</u>							
Expedited results requested by: <u>Same</u>					Relinquished By: <u>M. Mann</u>		Date/Time: <u>8-6-12 12:35</u>		Received in Lab By: <u>Shane</u>		Date/Time: <u>8-6-12 12:35pm</u>							
Who should AIC contact with questions: <u>J. Sorrells</u>					Comments:													
Phone: <u>501-262-1125</u> Fax: <u>501-262-0339</u>																		
Report Attention to:																		
Report Address to:																		

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: <u>Hot Springs Wastewater</u>			PO No. <u>12-3054</u>		No of BOTTLES	Analyses Requested										AIC Control No: <u>159927</u>	
Project Reference: <u>Bio-Monitoring</u>			Sample Matrix			<u>Bio Monitoring</u>										AIC Proposal No:	
Project Manager: <u>Jim Sorrells</u>			WATER SOIL													Carrier: <u>Hot Springs Delivery</u>	
Sampled By: <u>H. Mauldin</u>			GRAB COMP			Received Temperature °C: <u>2</u>											
AIC No.	Sample Identification	Date/Time Collected	G	R	A	C	W	A	S	O	I	L	No of BOTTLES	Remarks			
<u>2</u>	<u>PLANT EFFLUENT</u>	<u>8-7-12 0000-2400</u>						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>				<u>3</u>				
													Field pH calibration on _____ @ _____				
													Buffer:				
			Container Type														
			Preservative														
			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) <u>NORMAL</u> or EXPEDITED IN _____ DAYS						Relinquished By: <u>H. Mauldin</u>			Date/Time: <u>8-8-12 @ 1005</u>			Received By: <u>m. mann</u>			Date/Time: <u>8-8-12 10:05</u>		
Expedited results requested by: <u>SORRELLS</u>						Relinquished By: <u>M. Mann</u>			Date/Time: <u>8-8-12 @ 1010</u>			Received in Lab By: <u>Lisa Hopton</u>			Date/Time: <u>8-8-12 1110</u>		
Who should AIC contact with questions: <u>SAME</u>						Comments:											
Phone: <u>501-262-1125</u> Fax: <u>501-262-0883</u>																	
Report Attention to: <u>SAME</u>																	
Report Address to:																	

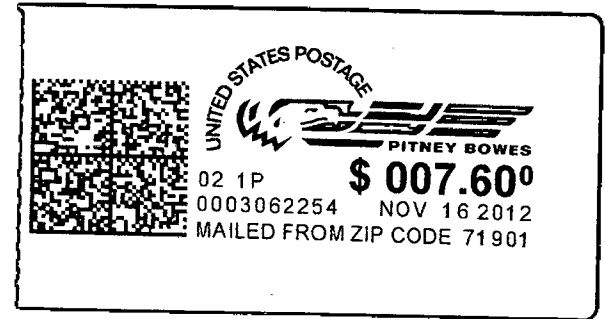
CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: <u>Hot Springs Wastewater</u>			PO No. <u>12-3054</u>		No of BOTTLES	Analyses Requested <u>Bio Monitoring</u>										AIC Control No: <u>159927</u>	
Project Reference: <u>BIO MONITORING</u>			Sample Matrix													AIC Proposal No:	
Project Manager: <u>JAMES SORRELLS</u>			GRA B	COMP		WATER	SOIL	Carrier: <u>Hot Springs Sluff</u>									
Sampled By: <u>H. Mann</u>								Received Temperature °C <u>2°C</u>									
AIC No.	Sample Identification	Date/Time Collected														Remarks	
<u>3</u>	<u>PLANT EFFLUENT</u>	<u>8-9-12 @ 0000-2400</u>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>												
			Container Type				Field pH calibration on _____ @ _____										
			Preservative				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) <u>NORMAL</u> or EXPEDITED IN _____ DAYS						Relinquished By: <u>A. Thomas</u>		Date/Time <u>8-10-12 @ 1030</u>		Received By: <u>M. Mann</u>		Date/Time <u>8-10-12 10:30am</u>					
Expedited results requested by: _____						Relinquished By: <u>M. Mann</u>		Date/Time <u>8-10-12 @ 11:40</u>		Received in Lab By: <u>[Signature]</u>		Date/Time <u>8/10/12 11:40</u>					
Who should AIC contact with questions: <u>Jim Sorrells</u>						Comments:											
Phone: <u>501-262-1125</u> Fax: <u>501-262-0339</u>																	
Report Attention to: <u>SAME</u>																	
Report Address to: _____																	

CERTIFIED MAIL™



7011 2970 0004 3943 4604



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

