AMERICAN INTERPLEX CORPORATION
LABORATORIES

Helena Industries, Inc.
ATTN: Mr. David Moak
Post Office Box 2338
West Helena, AR 72390

This report contains the analytical results and supporting information for the sample submitted on August 12, 2014. Attached please find a copy of the Chain of Custody and/or other documents received. Note that any remaining sample will be discarded two weeks from the original report date unless other arrangements are made.

This report is intended for the sole use of the client listed above. Assessment of the data requires access to the entire document.

This report has been reviewed by the Laboratory Director or a qualified designee.

John Overbey
Laboratory Director

This document has been distributed to the following:

PDF cc: Helena Industries, Inc.
ATTN: Mr. David Moak
moakd@helenaindustries.com

Helena Industries, Inc.
ATTN: Mr. Joe Garner
garners@helenaindustries.com

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Helena Industries, Inc.
Post Office Box 2338
West Helena, AR 72390

SAMPLE INFORMATION

Project Description:
One (1) water sample(s) received on August 12, 2014
NPDES
P.O. No. 42880

Receipt Details:
A Chain of Custody was provided. The samples were delivered in one (1) ice chest.
Ice chest #1 was delivered with shipping documentation.

Each sample container was checked for proper labeling, including date and time sampled. Sample containers were reviewed for proper type, adequate volume, integrity, temperature, preservation, and holding times. Any exceptions are noted below:

Sample Identification:

Laboratory ID	Client Sample ID	Sampled Date/Time	Notes
181501-1	WA4H01, WA4H02 8-11-2014 / 11:00	11-Aug-2014 1100	

Case Narrative:
There were no qualifiers for this data and all samples met quality control criteria.

References:
"Methods for Chemical Analysis of Water and Wastes", EPA/600/4-79-020 (Mar 1983) with updates and supplements EPA/600/5-91-010 (Jun 1991), EPA/600/R-92-129 (Aug 1992) and EPA/600/R-93-100 (Aug 1993).
"Test Methods for Evaluating Solid Waste Physical/Chemical Methods (SW846)", Third Edition.
"Standard Methods for the Examination of Water and Wastewaters", (SM).
"American Society for Testing and Materials" (ASTM).
"Association of Analytical Chemists" (AOAC).

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ANALYTICAL RESULTS

AIC No. 181501-1
Sample Identification: WA4H01, WA4H02 8-11-2014 / 11:00

Analyte		Result	RL	Units	Qualifier
COD		**15**	10	**mg/l**	
HACH 8000	Prep: 12-Aug-2014 1521 by 313	Analyzed: 13-Aug-2014 0830 by 313		Batch: W48828	
Zinc		**0.18**	0.002	**mg/l**	
EPA 200.8	Prep: 14-Aug-2014 0906 by 302	Analyzed: 14-Aug-2014 2116 by 302		Batch: S37216	

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LABORATORY CONTROL SAMPLE RESULTS

Analyte	Spike Amount	%	Limits	RPD	Limit	Batch	Preparation Date	Analysis Date	Dil	Qual
COD	100 mg/l	103	85.0-115			W48828	12Aug14 1522 by 313	13Aug14 0830 by 313		
Zinc	0.05 mg/l	106	85.0-115			S37216	14Aug14 0906 by 302	14Aug14 1904 by 302		

MATRIX SPIKE SAMPLE RESULTS

Analyte	Sample	Spike Amount	%	Limits	Batch	Preparation Date	Analysis Date	Dil	Qual
COD	181493-1	100 mg/l	100	80.0-120	W48828	12Aug14 1522 by 313	13Aug14 0830 by 313		
	181493-1	100 mg/l	95.1	80.0-120	W48828	12Aug14 1522 by 313	13Aug14 0830 by 313		
	Relative Percent Difference:		4.29	10.0	W48828				
Zinc	181477-2	0.05 mg/l	94.9	75.0-125	S37216	14Aug14 0906 by 302	14Aug14 1923 by 302		
	181477-2	0.05 mg/l	95.0	75.0-125	S37216	14Aug14 0906 by 302	14Aug14 1928 by 302		
	Relative Percent Difference:		0.0863	20.0	S37216				

LABORATORY BLANK RESULTS

Analyte	Result	RL	PQL	QC Sample	Preparation Date	Analysis Date	Qual
COD	< 10 mg/l	10	10	W48828-1	12Aug14 1522 by 313	13Aug14 0830 by 313	
Zinc	< 0.002 mg/l	0.002	0.002	S37216-1	14Aug14 0906 by 302	14Aug14 1855 by 302	

AMERICAN INTERPLEX CORPORATION LABORATORIES

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: Helena Industries
Project Reference: NPDES
Project Manager: David Mook
Sampled By: Joe Garner

PO No.

Sample Matrix: GR-B, COMP, WATER, SOIL

Lab No.	Sample Identification	Collected	No of BOTTLES	COD	Zinc	Bi-Monthly Acute	Remarks
1	WA4H01	8-11-2014 11:00 AM	1	X			
2	WA4H02	8-11-2014 11:00 AM	1		X		
3	WA4H03	8-11-2014 11:00 AM	1			X	

Container Type
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

AIC Control No: 181501
AIC Proposal No:
Carrier: UPS
Received Temperature °C: 1.0 °C

AIC # 181500

Field pH calibration on _____ @ _____ Buffer:

Turnaround Time Requested: (Please circle)
(NORMAL) or EXPEDITED IN ___ DAYS
Expedited results requested by: David Mook
Who should AIC contact with questions: David Mook
Phone: (970) 572-3434 Fax: (970) 572-3484
Report Attention to: David Mook & Joe Garner
Report Address to: P.O. Box 2338
West Helena, AR 72390

Relinquished By:	Date/Time	Received By:	Date/Time
	8-11-2014 11:00 AM		
Relinquished By:	Date/Time	Received in Lab By:	Date/Time
			8/12/14 1015

Comments:
Please email results to garner@helenalabs.com
UPS 12 31R WS 13 6981 0713

AMERICAN INTERPLEX CORPORATION LABORATORIES

September 3, 2014

Test Results of
Third Quarter
Chronic
Biomonitoring Testing
for
Outfall 002
Heber Springs, AR

Control No. 181729-1

Prepared for:

Mr. Kent Latch
Heber Springs Water & Sewer
1108 West Front Street
Heber Springs, AR 72543

Prepared by:

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

AMERICAN INTERPLEX CORPORATION LABORATORIES

Heber Springs Water & Sewer
ATTN: Mr. Kent Latch
1108 West Front Street
Heber Springs, AR 72543

Re: Chronic utilizing *Pimephales promelas* (Fathead minnow) and *Ceriodaphnia dubia*
Outfall 002 - Heber Springs, AR
NPDES Permit No. NPDES Permit AR0022381 AFIN 12-00029

Dear Mr. Kent Latch:

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:

Due to laboratory error, the second renewal was conducted with moderately hard water. This problem was reviewed with Ms. Barnett at ADEQ, who determined the test to be acceptable.

Method 1000.0 Chronic *Pimephales promelas* (Fathead minnow) Survival and Growth Test: The No Observable Effects Concentration (NOEC) for survival occurred at 11 % effluent, which is above the critical dilution of 8 %. The NOEC for growth occurred at 11 % effluent, which is above the critical dilution of 8 %. **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 11 % effluent, which is above the critical dilution of 8 %. The NOEC for reproduction occurred at 11 % effluent, which is above the critical dilution of 8 %. **The sample, therefore, PASSED both lethal and sub-lethal effects for the *Ceriodaphnia dubia* test.**

AMERICAN INTERPLEX CORPORATION

John Overbey
Laboratory Director

PDF cc: Heber Springs Water & Sewer
ATTN: Mr. Kent Latch
kent@heberspringswater.com

Table of Contents

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	0.339	PASS
Control Growth CV < or = 40%	29.4	PASS
Growth Minimum Significant Difference 12 to 30%	19.1	PASS
Critical Dilution CV < or = 40%	4.77	PASS

Ceriodaphnia dubia Method 1002.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	100	PASS
Control Reproduction > or = 15 per Surviving Female	29.8	PASS
Control CV < or = 40% per Surviving Female	9.33	PASS
Reproduction Minimum Significant Difference 13 to 47%	16.1	PASS
Critical Dilution CV < or = 40%	19.9	PASS

II. Outlined Report

A. Introduction

1. Permit Number: NPDES Permit AR0022381 AFIN 12-00029
2. Test Requirements: Chronic Biomonitoring, Quarterly
   Test Methods 1000.0 and 1002.0
3. Receiving Stream: White River Basin

B. Source of Effluent/Dilution Water

1. Effluent Samples:
   a. Sampling Point: Outfall 002
   b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	8.1	8.0	7.3
pH (standard units)	6.7	7.1	7.0
Alkalinity (mg/l as CaCO3)	22	24	22
Hardness (mg/l as CaCO3)	35	36	36
Conductivity (umhos/cm)	200	210	200
Residual Chlorine (mg/l)	0.090	0.090	0.10
Ammonia as N (mg/l)	1.4	1.1	1.1

2. Dilution Water Samples: Synthetic Soft Water #4127
   a. Dates Prepared: August 15 through August 29, 2014
   b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	8.3	7.6	6.8
pH (standard units)	7.1	7.7	7.5
Alkalinity (mg/l as CaCO3)	28	52	28
Hardness (mg/l as CaCO3)	44	80	45
Conductivity (umhos/cm)	140	170	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:	August 19, 2014 at 1515
Date & Time Test Terminated:	August 26, 2014 at 1335
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 19, 2014 at 1500
Date & Time Test Terminated:	Augsut 26, 2014 at 1430
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. Steel's Many-One Rank test was used to determine the No Observable Effects Concentration (NOEC) for growth. Dunnett's Test was used to calculate the PMSD.

Ceriodaphnia dubia survival data was analyzed with Fisher's Exact Test. Reproduction data was analyzed using Kolmogorov's Test for Normality and Bartlett's test and analyzed with 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 8, 2014 at 1615 to July 15, 2014 at 1500
The results were as follows: (Control No. 180430-1.)
Survival LC-50: 4632 mg/l
Growth IC-25: 2837 mg/l
Growth PMSD: 9.25

Ceriodaphnia dubia

Chronic reference tests are performed monthly.
A chronic reference test was performed on July 8, 2014 at 1620 to July 14, 2014 at 1420
The results were as follows: (Control No. 180430-2.)
Survival LC-50: 2019 mg/l
Growth IC-25: 842.6 mg/l
Growth PMSD: 15.9

V. Chemical Analysis/Quality Control

Parameter	Method	% Recovery	Relative % Difference
Alkalinity	SM 2320 B	NA	0.00
Hardness	EPA 200.7	99.5	2.12
pH	SM 4500-H+ B	100	0.407
Conductivity	EPA 120.1	96.6	3.46

VI. Organism History

Pimephales promelas (Fathead minnow)

Date: August 19, 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: August 19, 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

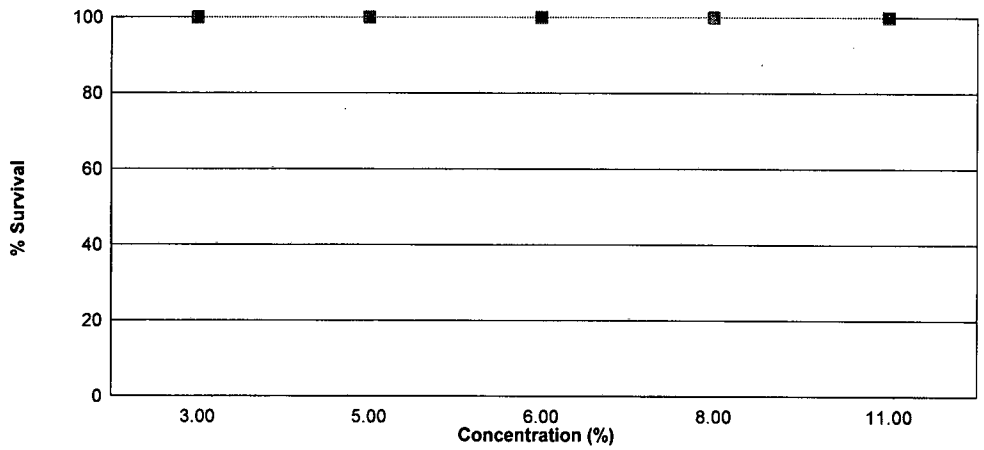
Larvae are exposed in a static renewal system for seven days to different concentrations of effluent with dilution water. Test results are based on the survival and growth (increase in weight) of the larvae.

Effluent dilutions for this test were 3 %, 5 %, 6 %, 8 %, 11 % in accordance with the NPDES permit.

The low flow or 'critical' dilution is specified in the NPDES permit as 8 % effluent.

The test was initiated on August 19, 2014 at 1515 and continued through August 26, 2014 at 1335. Statistical analyses were performed on the observed data and the no observable effects concentrations (NOECs) were as follows:

a.) NOEC survival = 11 % effluent
b.) NOEC growth = 11 % effluent



Summary of the 7-day Fathead Minnow Survival and Growth		
Concentration	Percent Survival	Mean Growth (mg)
Control	100	0.339
3 %	100	0.334
5 %	100	0.319
6 %	100	0.335
8 %	100	0.350
11 %	100	0.353

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

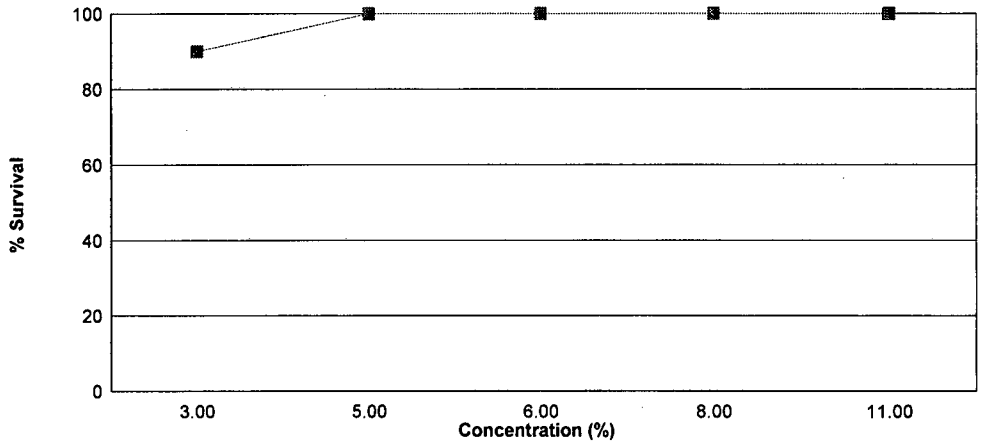
Neonates are exposed in a static renewal system to different concentrations of effluent with dilution water until 60% of surviving control organisms have three broods of offspring with an average of at least 15 young per female.

Effluent dilutions for this test were 3 %, 5 %, 6 %, 8 %, 11 % in accordance with the NPDES permit.

The low flow or 'critical' dilution is specified in the NPDES permit as 8 % effluent.

The test was initiated on August 19, 2014 at 1500 and continued through Augsut 26, 2014 at 1430. Statistical analyses were performed on the observed data and the no observable effects concentrations (NOECs) were as follows:

a.) NOEC survival = 11 % effluent
b.) NOEC reproduction = 11 % effluent



Summary of the 7-day *Ceriodaphnia dubia* Survival and Reproduction Data		
Concentration	Percent Survival	Mean Reproduction
Control	100	29.8
3 %	90.0	24.9
5 %	100	30.3
6 %	100	27.9
8 %	100	28.9
11 %	100	29.2

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Survival

Date and Time Test Initiated: August 19, 2014 at 1515
Date and Time Test Terminated: August 26, 2014 at 1335

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
3 %	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
5 %	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
6 %	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
8 %	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
11 %	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: August 19, 2014 at 1515
Test Terminated: August 26, 2014 at 1335
Drying Started: August 25, 2014 at 1000
Drying Ended: August 27, 2014 at 1050

Concentration	Replicate	Weight of pan	Weight of pan + fish	Total weight of fish (g)	Original # of fish	Mean dry weight (mg)
Control	A	.94868	.95045	0.00177	8	0.221
	B	.94820	.95084	0.00264	8	0.330
	C	.95190	.95456	0.00266	8	0.332
	D	.95436	.95834	0.00398	8	0.498
	E	.94436	.94689	0.00253	8	0.316
3 %	A	.94806	.95075	0.00269	8	0.336
	B	.94959	.95237	0.00278	8	0.348
	C	.94685	.94942	0.00257	8	0.321
	D	.94576	.94850	0.00274	8	0.342
	E	.94586	.94846	0.00260	8	0.325
5 %	A	.94498	.94742	0.00244	8	0.305
	B	.94683	.94937	0.00254	8	0.318
	C	.94782	.95041	0.00259	8	0.324
	D	.94646	.94911	0.00265	8	0.331
	E	.94640	.94892	0.00252	8	0.315
6 %	A	.94193	.94443	0.00250	8	0.312
	B	.94071	.94342	0.00271	8	0.339
	C	.94581	.94874	0.00293	8	0.366
	D	.94811	.95065	0.00254	8	0.318
	E	.94695	.94969	0.00274	8	0.342
8 %	A	.94911	.95184	0.00273	8	0.341
	B	.94726	.95001	0.00275	8	0.344
	C	.94270	.94534	0.00264	8	0.330
	D	.94198	.94494	0.00296	8	0.370
	E	.93900	.94191	0.00291	8	0.364
11 %	A	.93888	.94157	0.00269	8	0.336
	B	.94209	.94484	0.00275	8	0.344
	C	.94128	.94430	0.00302	8	0.378
	D	.94597	.94868	0.00271	8	0.339
	E	.94862	.95156	0.00294	8	0.368

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: August 19, 2014 at 1500
Date and Time Test Terminated: Augsut 26, 2014 at 1430

Concentration: Control													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	0	0	10	0.00
4	4	0	4	4	4	4	4	4	5	4	37	10	3.70
5	11	8	10	10	0	10	10	10	0	11	80	10	8.00
6	0	12	0	0	10	13	0	15	11	13	74	10	7.40
7	16	15	14	16	13	0	15	0	18	0	107	10	10.7
8													
TOTAL	31	35	28	30	27	27	29	29	34	28	298	10	29.8

Concentration: 3 %													
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	X	0	0	0	0	0	0	0	9	0.00
4	4	4	4	X	0	4	4	4	4	4	32	9	3.56
5	10	8	8	X	6	10	10	8	12	12	84	9	9.33
6	0	0	0	X	7	10	0	0	16	0	33	9	3.67
7	16	15	17	X	0	0	17	16	0	19	100	9	11.1
8													
TOTAL	30	27	29	0	13	24	31	28	32	35	249	10	24.9

Concentration: 5 %													
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	5	4	3	4	5	4	4	4	4	6	43	10	4.30
5	10	10	11	8	0	12	12	10	12	10	95	10	9.50
6	11	0	11	0	12	14	17	15	17	0	97	10	9.70
7	0	19	0	15	17	0	0	0	0	17	68	10	6.80
8													
TOTAL	26	33	25	27	34	30	33	29	33	33	303	10	30.3

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: August 19, 2014 at 1500
Date and Time Test Terminated: Augsut 26, 2014 at 1430

Concentration: 6 %													
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	0	4	4	5	5	4	4	4	5	39	10	3.90
5	10	10	12	8	0	12	10	8	10	10	90	10	9.00
6	10	15	17	14	10	13	14	13	0	14	120	10	12.0
7	0	0	0	0	14	0	0	0	16	0	30	10	3.00
8													
TOTAL	24	25	33	26	29	30	28	25	30	29	279	10	27.9

Concentration: 8 %													
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	5	0	4	4	5	4	4	4	4	4	38	10	3.80
5	10	10	12	0	0	10	10	10	12	12	86	10	8.60
6	10	12	12	14	9	13	0	0	0	12	82	10	8.20
7	0	18	0	0	14	0	19	15	17	0	83	10	8.30
8													
TOTAL	25	40	28	18	28	27	33	29	33	28	289	10	28.9

Concentration: 11 %													
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	0	0	4	5	4	4	4	5	4	34	10	3.40
5	12	6	10	10	0	12	8	11	10	10	89	10	8.90
6	14	13	14	0	12	16	13	0	0	0	82	10	8.20
7	0	0	0	17	18	0	0	17	18	17	87	10	8.70
8													
TOTAL	30	19	24	31	35	32	25	32	33	31	292	10	29.2

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	3 %	1	1.00000	1.39310
2	3 %	2	1.00000	1.39310
2	3 %	3	1.00000	1.39310
2	3 %	4	1.00000	1.39310
2	3 %	5	1.00000	1.39310
3	5 %	1	1.00000	1.39310
3	5 %	2	1.00000	1.39310
3	5 %	3	1.00000	1.39310
3	5 %	4	1.00000	1.39310
3	5 %	5	1.00000	1.39310
4	6 %	1	1.00000	1.39310
4	6 %	2	1.00000	1.39310
4	6 %	3	1.00000	1.39310
4	6 %	4	1.00000	1.39310
4	6 %	5	1.00000	1.39310
5	8 %	1	1.00000	1.39310
5	8 %	2	1.00000	1.39310
5	8 %	3	1.00000	1.39310
5	8 %	4	1.00000	1.39310
5	8 %	5	1.00000	1.39310
6	11 %	1	1.00000	1.39310
6	11 %	2	1.00000	1.39310
6	11 %	3	1.00000	1.39310
6	11 %	4	1.00000	1.39310
6	11 %	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		
W = 0		
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	3 %	27.50	16.00	5.00	
3	5 %	27.50	16.00	5.00	
4	6 %	27.50	16.00	5.00	
5	8 %	27.50	16.00	5.00	
6	11 %	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
D = 0.04513		
W = 0.7053		
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					No Transformation
Ho:Control<Treatment					
Group	Identification	Rank Sum	Critical Value	DF	Sig 0.05
1	Control				
2	3 %	31.00	16.00	5.00	
3	5 %	24.00	16.00	5.00	
4	6 %	30.00	16.00	5.00	
5	8 %	33.50	16.00	5.00	
6	11 %	35.00	16.00	5.00	
Critical values are 1 tailed (k=5)					

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Growth

Dunnett's Test for PMSD Calculation (excluding deaths if applicable)

ANOVA Table — No Transformation

SOURCE	DF	SS	MS	F
Between	5	0.003806	0.0007612	0.4049
Within (Error)	24	0.04513	0.00188	
Total	29	0.04894		

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	0.3394	0.3394		
2	3 %	0.3344	0.3344	0.1823	
3	5 %	0.3186	0.3186	0.7585	
4	6 %	0.3354	0.3354	0.1459	
5	8 %	0.3498	0.3498	-0.3792	
6	11 %	0.353	0.353	-0.4959	

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	3 %	5	0.06472	19.1	0.005
3	5 %	5	0.06472	19.1	0.0208
4	6 %	5	0.06472	19.1	0.004
5	8 %	5	0.06472	19.1	-0.0104
6	11 %	5	0.06472	19.1	-0.0136

Appendix A2: Statistics

Ceriodaphnia dubia Survival

Fisher's Exact Test			
Identification	Alive	Dead	Total Animals
Control	10	0	10
3 %	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
5 %	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
6 %	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
8 %	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
11 %	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	3 %	10	1	
2	5 %	10	0	
3	6 %	10	0	
4	8 %	10	0	
5	11 %	10	0	

Appendix A2: Statistics

Ceriodaphnia dubia Reproduction

Kolmogorov Test for Normality		No Transformation
D = 0.1148		
D* = 0.9007		
Critical D* = 1.035	(alpha = 0.01, N = 60)	
Data PASS normality test (alpha = 0.01).		

Bartlett's Test for Homogeneity of Variance		No Transformation
Calculated B1 statistic = 25.56		
Critical B = 15.086	(alpha = 0.01, df = 5)	
Data FAIL B1 homogeneity test at 0.01 level.		

Steel's Many-One Rank Test					No Transformation
Ho:Control<Treatment					
Group	Identification	Rank Sum	Critical Value	DF	Sig 0.05
1	Control				
2	3 %	95.50	75.00	10.00	
3	5 %	108.00	75.00	10.00	
4	6 %	89.00	75.00	10.00	
5	8 %	96.00	75.00	10.00	
6	11 %	110.00	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	51.88	10.38	0.5088
Within (Error)	53	1081	20.4	
Total	58	1133		

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	29.8	29.8		
2	3 %	27.667	27.667	1.028	
3	5 %	30.3	30.3	-0.2475	
4	6 %	27.9	27.9	0.9406	
5	8 %	28.9	28.9	0.4456	
6	11 %	29.2	29.2	0.297	

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	3 %	9	4.794	16.1	2.133
3	5 %	10	4.666	15.7	-0.5
4	6 %	10	4.666	15.7	1.9
5	8 %	10	4.666	15.7	0.9
6	11 %	10	4.666	15.7	0.6

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: August 19, 2014 at 1312
Date and Time Test Terminated: August 26, 2014 at 1430

Effluent Conc.: Control		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.3	8.0	7.6	8.8	6.8	7.6	7.9
	Final *1	7.1	6.8	7.1	6.7	7.0	8.1	6.7
	Final *2	8.8	7.9	8.8	7.7	8.0	8.8	7.9
pH, units	Initial	7.1	7.4	7.7	7.4	7.5	7.6	7.5
	Final *1	7.4	7.4	7.4	7.4	7.6	7.5	7.3
	Final *2	7.4	7.7	7.6	8.0	7.7	7.6	7.7
Alkalinity, mg CaCO3/l		28	NA	52	NA	28	NA	NA
Hardness, mg CaCO3/l		44	NA	80	NA	45	NA	NA
Conductivity, umhos/cm		140	140	170	150	150	160	150
Res. Chlorine, mg/l		<0.05	NA	<0.05	NA	<0.05	NA	NA

Effluent Conc.: 3 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.1	7.9	7.6	8.7	7.1	7.8	7.9
	Final *1	6.9	6.9	7.0	6.7	7.0	7.7	6.8
	Final *2	8.9	8.0	8.9	7.8	8.0	8.8	7.4
pH, units	Initial	7.2	7.4	7.9	7.7	7.4	7.6	7.4
	Final *1	7.4	7.4	7.6	7.7	7.6	7.5	7.3
	Final *2	7.6	7.7	7.9	8.3	7.7	7.6	7.6

Effluent Conc.: 5 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.1	7.9	7.6	8.5	7.1	7.8	7.9
	Final *1	7.0	8.3	7.0	6.8	7.1	7.1	7.1
	Final *2	8.6	7.9	8.7	7.8	7.9	8.8	7.6
pH, units	Initial	7.2	7.3	7.9	7.6	7.4	7.6	7.4
	Final *1	7.4	7.4	7.6	7.7	7.6	7.5	7.3
	Final *2	7.6	7.7	7.9	8.3	7.8	7.6	7.6

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: August 19, 2014 at 1312
Date and Time Test Terminated: August 26, 2014 at 1430

Effluent Conc.: 6 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.1	8.0	7.6	8.7	7.0	7.8	7.8
	Final *1	6.8	8.0	6.8	6.7	7.0	7.2	6.7
	Final *2	8.9	8.0	8.9	7.7	8.0	8.8	7.9
pH, units	Initial	7.2	7.4	7.8	7.6	7.4	7.5	7.4
	Final *1	7.3	7.4	7.6	7.6	7.6	7.5	7.3
	Final *2	7.6	7.7	7.9	8.3	7.7	7.6	7.6

Effluent Conc.: 8 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.2	8.0	7.5	8.5	7.1	7.9	7.9
	Final *1	6.9	7.8	6.8	6.6	7.0	7.1	6.8
	Final *2	8.8	7.9	8.8	7.7	7.9	8.8	8.0
pH, units	Initial	7.2	7.3	7.8	7.7	7.4	7.5	7.4
	Final *1	7.4	7.3	7.5	7.6	7.6	7.6	7.3
	Final *2	7.6	7.6	7.9	8.3	7.6	7.6	7.6
Alkalinity, mg CaCO3/l		26	NA	50	NA	28	NA	NA
Hardness, mg CaCO3/l		44	NA	82	NA	47	NA	NA
Conductivity, umhos/cm		140	150	280	260	150	160	150
Res. Chlorine, mg/l		<0.05	NA	<0.05	NA	<0.05	NA	NA

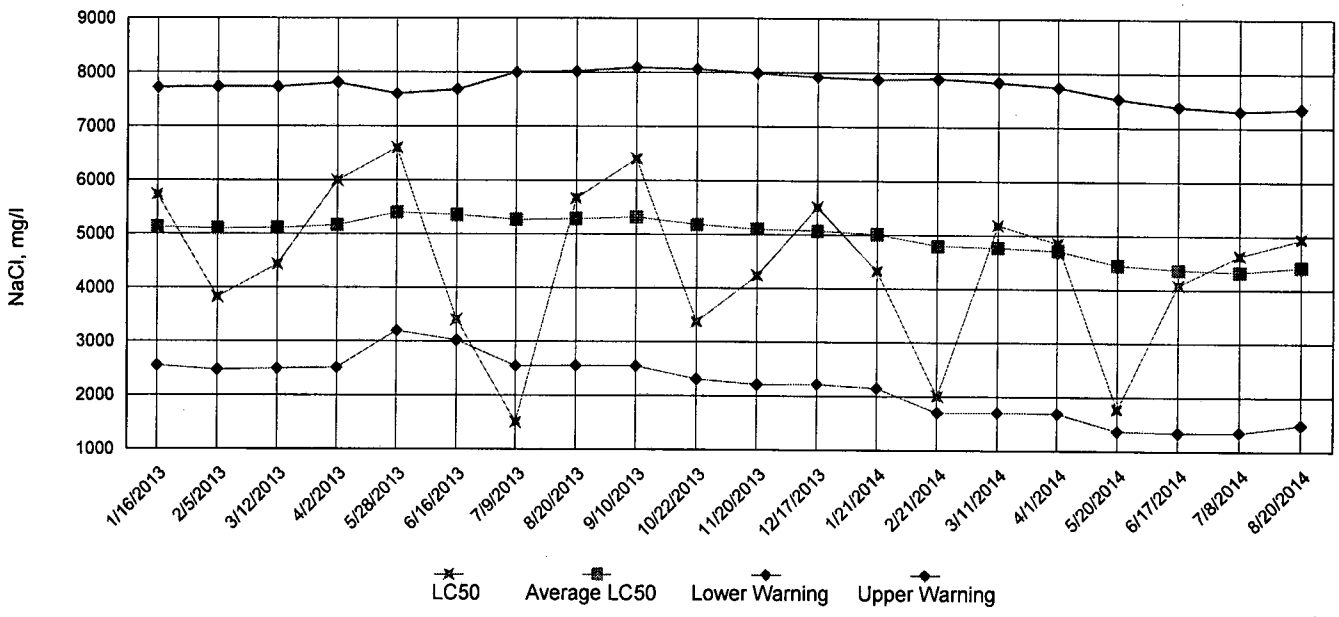
Effluent Conc.: 11 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.3	7.8	7.6	8.2	7.2	7.9	7.9
	Final *1	6.8	7.9	6.9	6.8	7.0	8.1	6.8
	Final *2	8.8	7.9	8.8	7.7	7.9	8.9	7.6
pH, units	Initial	7.2	7.3	7.8	7.6	7.4	7.5	7.4
	Final *1	7.4	7.4	7.6	7.7	7.7	7.5	7.3
	Final *2	7.6	7.7	7.9	8.2	7.7	7.6	7.6

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

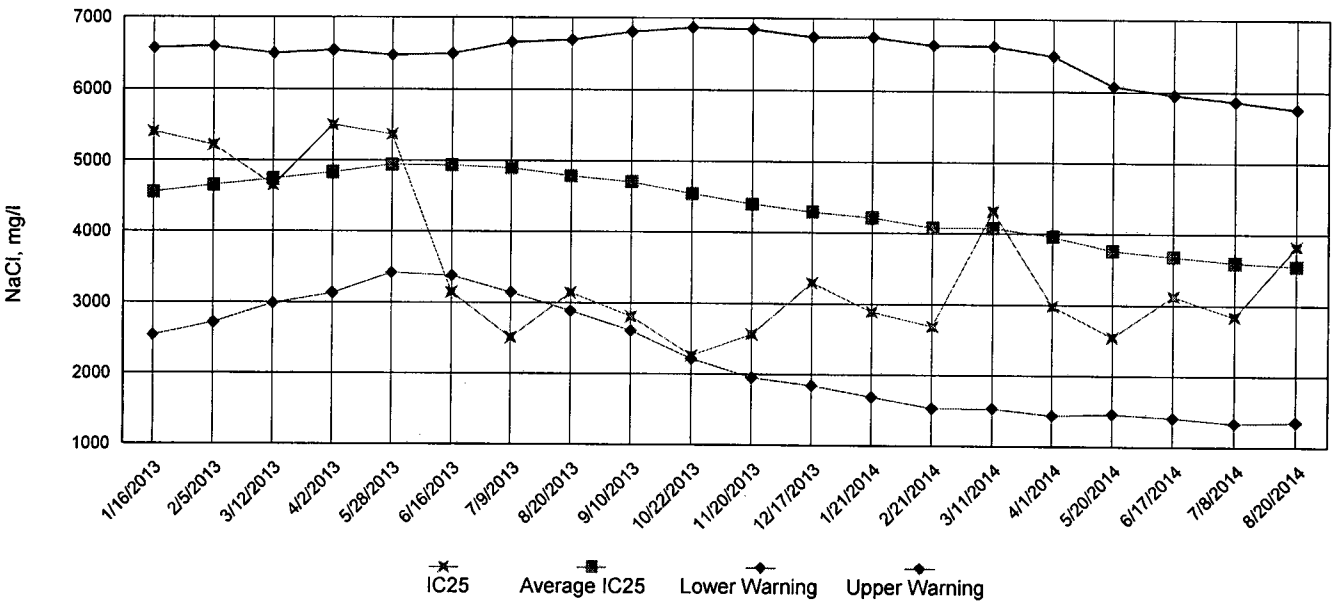
Appendix A4: Test 1000.0

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

LC50 Survival Data



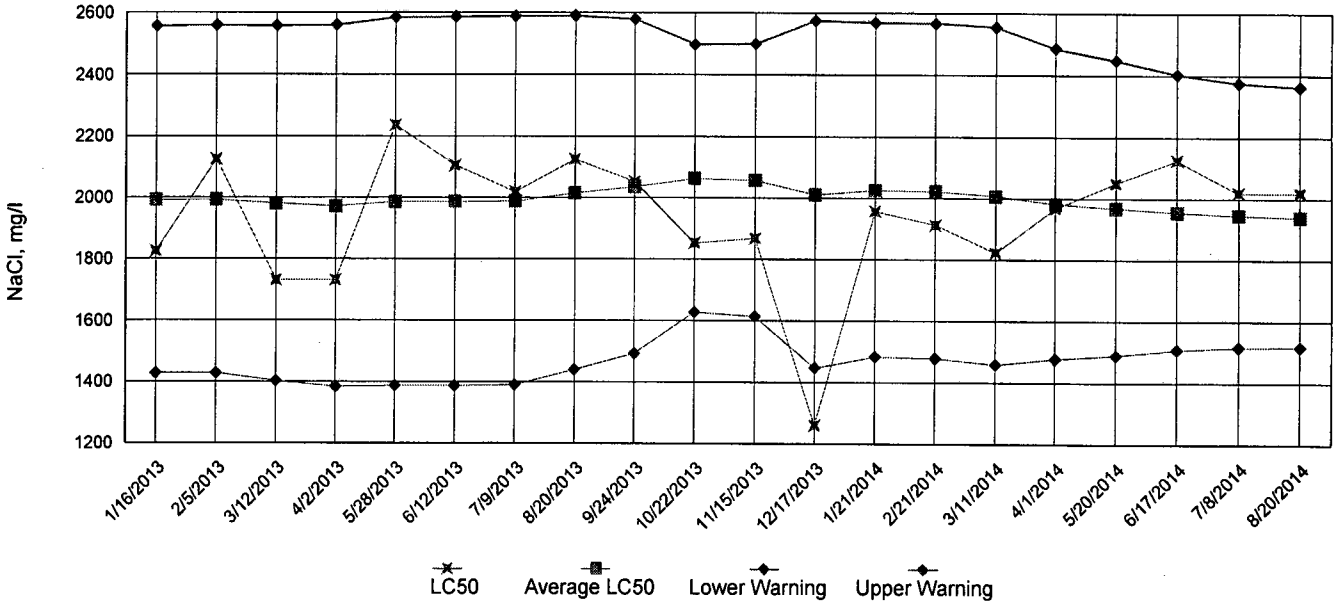
IC25 Growth Data



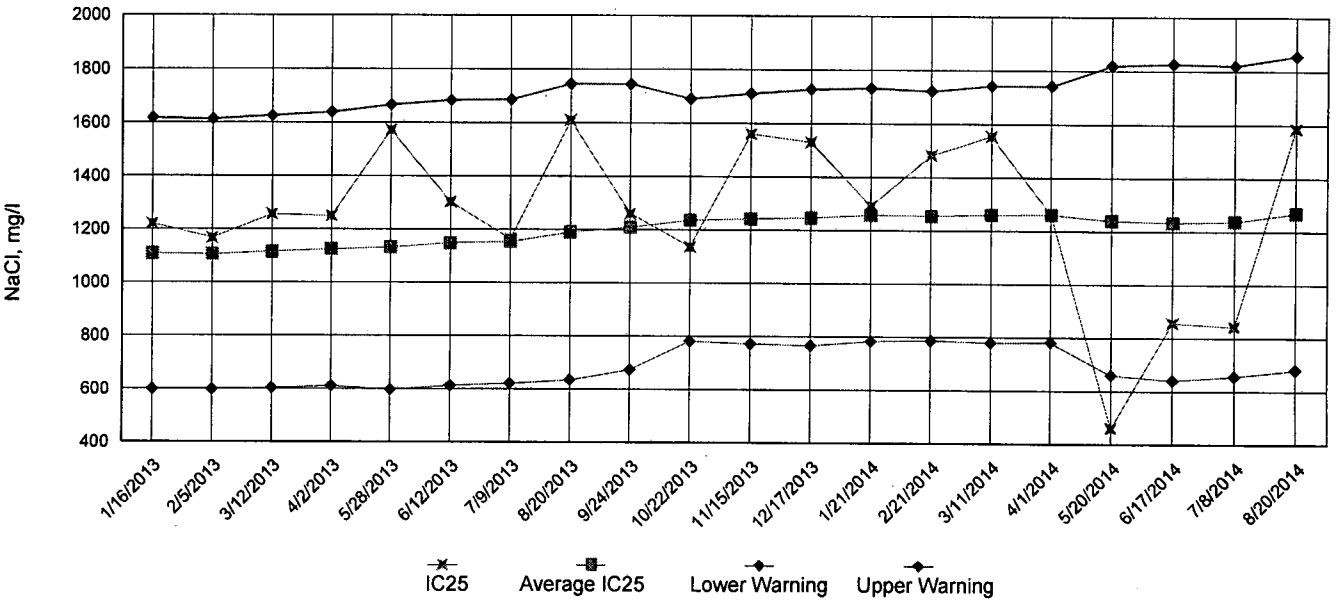
Appendix A4: Test 1002.0

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: Heber Springs Water & Sewer

NPDES No.: NPDES Permit AR0022381 AFIN 12-00029

Date and Time Test Initiated: August 19, 2014 at 1515
Date and Time Test Terminated: August 26, 2014 at 1335
Dilution water used: Synthetic Soft Water #4127

DATA TABLE FOR SURVIVAL

Effluent Conc. %	Percent Survival in replicate chambers A	B	C	D	E	Mean percent survival 24 hr	48 hr	7 days	CV%
Control	100	100	100	100	100	100	100	100	0.00
3 %	100	100	100	100	100	100	100	100	0.00
5 %	100	100	100	100	100	100	100	100	0.00
6 %	100	100	100	100	100	100	100	100	0.00
8 %	100	100	100	100	100	100	100	100	0.00
11 %	100	100	100	100	100	100	100	100	0.00

DATA TABLE FOR GROWTH

Effluent Conc. %	Average dry weight, mg replicate chambers A	B	C	D	E	Mean dry weight, mg	CV%
Control	0.221	0.330	0.332	0.498	0.316	0.339	29.4
3 %	0.336	0.348	0.321	0.342	0.325	0.334	3.39
5 %	0.305	0.318	0.324	0.331	0.315	0.319	3.06
6 %	0.312	0.339	0.366	0.318	0.342	0.335	6.40
8 %	0.341	0.344	0.330	0.370	0.364	0.35	4.77
11 %	0.336	0.344	0.378	0.339	0.368	0.353	5.33

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	(8 %)	____YES	X NO
b.) 1/2 LOW FLOW DILUTION	(NA)	____YES	____NO

2. Steel's Many-One Rank 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	(8 %)	____YES	X NO
b.) 1/2 LOW FLOW DILUTION	(NA)	____YES	____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: 11 % (TOP6C)
6. LOEC Pimephales Lethality: 11 % (TXP6C)
7. NOEC Pimephales Sublethality: 11 % (TPP6C)
8. LOEC Pimephales Sublethality: 11 % (TYP6C)
9. Coefficient of variation for Pimephales growth: 29.4 (TQP6C)

Appendix B: Test 1000.0

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

PERMITTEE: Heber Springs Water & Sewer
NPDES NO.: NPDES Permit AR0022381 AFIN
CONTACT: Mr. Kent Latch
ANALYST: 280, 304, 307, 310

SAMPLE No. 1 COLLECTED ending: DATE: August 19, 2014 TIME: 0800
SAMPLE No. 2 COLLECTED ending: DATE: August 20, 2014 TIME: 0800
SAMPLE No. 3 COLLECTED ending: DATE: August 22, 2014 TIME: 0800
Test Initiated: DATE: August 19, 2014 TIME: 1515
Test Terminated: DATE: August 26, 2014 TIME: 1335

DILUTION Control	DAY 1	2	3	4	5	6	7
D.O. Initial	8.3	8.0	7.6	8.8	6.8	7.6	7.9
Final	7.1	6.8	7.1	6.7	7.0	8.1	6.7
pH Initial	7.1	7.4	7.7	7.4	7.5	7.6	7.5
Final	7.4	7.4	7.4	7.4	7.6	7.5	7.3
Alkalinity	28	NA	52	NA	28	NA	NA
Hardness	44	NA	80	NA	45	NA	NA
Conductivity	140	140	170	150	150	160	150
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 3 %	DAY 1	2	3	4	5	6	7
D.O. Initial	8.1	7.9	7.6	8.7	7.1	7.8	7.9
Final	6.9	6.9	7.0	6.7	7.0	7.7	6.8
pH Initial	7.2	7.4	7.9	7.7	7.4	7.6	7.4
Final	7.4	7.4	7.6	7.7	7.6	7.5	7.3
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	140	150	290	260	150	160	150
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 5 %	DAY 1	2	3	4	5	6	7
D.O. Initial	8.1	7.9	7.6	8.5	7.1	7.8	7.9
Final	7.0	8.3	7.0	6.8	7.1	7.1	7.1
pH Initial	7.2	7.3	7.9	7.6	7.4	7.6	7.4
Final	7.4	7.4	7.6	7.7	7.6	7.5	7.3
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	140	150	290	260	150	160	150
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 6 %	DAY 1	2	3	4	5	6	7
D.O. Initial	8.1	8.0	7.6	8.7	7.0	7.8	7.8
Final	6.8	8.0	6.8	6.7	7.0	7.2	6.7
pH Initial	7.2	7.4	7.8	7.6	7.4	7.5	7.4
Final	7.3	7.4	7.6	7.6	7.6	7.5	7.3
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	140	150	280	260	150	160	150
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 8 %	DAY 1	2	3	4	5	6	7
D.O. Initial	8.2	8.0	7.5	8.5	7.1	7.9	7.9
Final	6.9	7.8	6.8	6.6	7.0	7.1	6.8
pH Initial	7.2	7.3	7.8	7.7	7.4	7.5	7.4
Final	7.4	7.3	7.5	7.6	7.6	7.6	7.3
Alkalinity	26	NA	50	NA	28	NA	NA
Hardness	44	NA	82	NA	47	NA	NA
Conductivity	140	150	280	260	150	160	150
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 11 %	DAY 1	2	3	4	5	6	7
D.O. Initial	8.3	7.8	7.6	8.2	7.2	7.9	7.9
Final	6.8	7.9	6.9	6.8	7.0	8.1	6.8
pH Initial	7.2	7.3	7.8	7.6	7.4	7.5	7.4
Final	7.4	7.4	7.6	7.7	7.7	7.5	7.3
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	150	150	280	260	160	160	160
Chlorine	NA	NA	NA	NA	NA	NA	NA

Appendix B: Test 1002.0

SUMMARY REPORTING FORMS
CHRONIC BIOMONITORING
Ceriodaphnia dubia
SURVIVAL AND REPRODUCTION

Permittee: Heber Springs Water & Sewer

NPDES No.: NPDES Permit AR0022381 AFIN 12-00029

Date and Time Test Initiated: August 19, 2014 at 1500
Date and Time Test Terminated: Augsut 26, 2014 at 1430
Dilution water used: Synthetic Soft Water #4127

PERCENT SURVIVAL

Time of Reading	Control	Percent Effluent 3 %	5 %	6 %	8 %	11 %
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 3 %	5 %	6 %	8 %	11 %
A	31	30	26	24	25	30
B	35	27	33	25	40	19
C	28	29	25	33	28	24
D	30	0	27	26	18	31
E	27	13	34	29	28	35
F	27	24	30	30	27	32
G	29	31	33	28	33	25
H	29	28	29	25	29	32
I	34	32	33	30	33	33
J	28	35	33	29	28	31
Mean per Adult	29.8	24.9	30.3	27.9	28.9	29.2
Mean per Surviving Adult	29.8	27.7	30.3	27.9	28.9	29.2
CV %	9.33	22.9	11.1	10.2	19.9	16.9

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	(8 %)	____YES	__X__ 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	(8 %)	____YES	__X__ 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: __11 %__ (TOP3B)

6. LOEC Ceriodaphnia Lethality: __11 %__ (TXP3B)

7. NOEC Ceriodaphnia Sublethality: __11 %__ (TPP3B)

8. LOEC Ceriodaphnia Sublethality: __11 %__ (TYP3B)

9. Coefficient of variation for Ceriodaphnia Reproduction: __19.9__ (TQP3B)

Appendix B: Test 1002.0

CHRONIC TOXICITY SUMMARY FORM
Ceriodaphnia dubia
CHEMICAL PARAMETERS CHART

PERMITTEE: Heber Springs Water & Sewer
NPDES NO.: NPDES Permit AR0022381 AFIN
CONTACT: Mr. Kent Latch
ANALYST: 280, 304, 307, 310

SAMPLE No. 1 COLLECTED ending: DATE: August 19, 2014 TIME: 0800
SAMPLE No. 2 COLLECTED ending: DATE: August 20, 2014 TIME: 0800
SAMPLE No. 3 COLLECTED ending: DATE: August 22, 2014 TIME: 0800
Test Initiated: DATE: August 19, 2014 TIME: 1500
Test Terminated: DATE: Augsut 26, 2014 TIME: 1430

DILUTION Control	DAY 1	2	3	4	5	6	7
D.O. Initial	8.3	8.0	7.6	8.8	6.8	7.6	7.9
Final	8.8	7.9	8.8	7.7	8.0	8.8	7.9
pH Initial	7.1	7.4	7.7	7.4	7.5	7.6	7.5
Final	7.4	7.7	7.6	8.0	7.7	7.6	7.7
Alkalinity	28	NA	52	NA	28	NA	NA
Hardness	44	NA	80	NA	45	NA	NA
Conductivity	140	140	170	150	150	160	150
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 3 %	DAY 1	2	3	4	5	6	7
D.O. Initial	8.1	7.9	7.6	8.7	7.1	7.8	7.9
Final	8.9	8.0	8.9	7.8	8.0	8.8	7.4
pH Initial	7.2	7.4	7.9	7.7	7.4	7.6	7.4
Final	7.6	7.7	7.9	8.3	7.7	7.6	7.6
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	140	150	290	260	150	160	150
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 5 %	DAY 1	2	3	4	5	6	7
D.O. Initial	8.1	7.9	7.6	8.5	7.1	7.8	7.9
Final	8.6	7.9	8.7	7.8	7.9	8.8	7.6
pH Initial	7.2	7.3	7.9	7.6	7.4	7.6	7.4
Final	7.6	7.7	7.9	8.3	7.8	7.6	7.6
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	140	150	290	260	150	160	150
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 6 %	DAY 1	2	3	4	5	6	7
D.O. Initial	8.1	8.0	7.6	8.7	7.0	7.8	7.8
Final	8.9	8.0	8.9	7.7	8.0	8.8	7.9
pH Initial	7.2	7.4	7.8	7.6	7.4	7.5	7.4
Final	7.6	7.7	7.9	8.3	7.7	7.6	7.6
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	140	150	280	260	150	160	150
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 8 %	DAY 1	2	3	4	5	6	7
D.O. Initial	8.2	8.0	7.5	8.5	7.1	7.9	7.9
Final	8.8	7.9	8.8	7.7	7.9	8.8	8.0
pH Initial	7.2	7.3	7.8	7.7	7.4	7.5	7.4
Final	7.6	7.6	7.9	8.3	7.6	7.6	7.6
Alkalinity	26	NA	50	NA	28	NA	NA
Hardness	44	NA	82	NA	47	NA	NA
Conductivity	140	150	280	260	150	160	150
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 11 %	DAY 1	2	3	4	5	6	7
D.O. Initial	8.3	7.8	7.6	8.2	7.2	7.9	7.9
Final	8.8	7.9	8.8	7.7	7.9	8.9	7.6
pH Initial	7.2	7.3	7.8	7.6	7.4	7.5	7.4
Final	7.6	7.7	7.9	8.2	7.7	7.6	7.6
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	150	150	280	260	160	160	160
Chlorine	NA	NA	NA	NA	NA	NA	NA

AMERICAN INTERPLEX CORPORATION
LABORATORIES

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: Heber Springs Water & Waste Water Dept
Project Reference: 3RD QUARTER CHRONIC BIOMONITORING
Project Manager: Kent Latch
Sampled By: S.Q. & Joey Massey

PO No. 14775

AIC CONTROL NO: 181729
AIC PROPOSAL NO:
Carrier: Heber Springs Water Dept.
Received Temperature C: 0.6 C

AIC No.	Sample Identification	Date/Time Collected	GRAB	COMP	MATRIX WATER	MATRIX SOIL	NO OF BOTTLES	ANALYSES REQUESTED	Remarks
	CO2A (EFFL) 24HR COMP. H.S. W.W.T.P.	8-18-14 8AM TO 8-19-14 8AM		24 HR	✓		3	CHRONIC BIOMONITORING 3RD QUARTER	
		Container Type							Field pH calibration
		Preservative							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 A=$(NH_4)_2SO_4$, NH_4OH

Turnaround Time Requested: (Please circle)
NORMAL or EXPEDITED IN 7 DAYS
Expedited results requested by: Kent Latch
Who should AIC contact with questions: Sam Querry
Phone: 501-362-3422 Fax: 501-362-3338
Report Attention to: Kent Latch
Report Address to: Heber Springs Water & Waste Water Dept.
1108 W. Front St.
Heber Springs, Ark.

Relinquished By	Date/Time	Received By	Date/Time
Sam Querry	8-19-14 8:10 AM.	Randy White	8-19-14 8:10 am
Randy White	8-19-14 10:10 AM		

Received in Lab By:	Date/Time
	8/19/14 1000

Comments:

FORM 0060

AMERICAN INTERPLEX CORPORATION
LABORATORIES

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: Heber Springs Water & Waste Water Dept.
Project: 3RD QUARTER
Reference: BIOMONITORING
Project Manager: KENT LATCH
Sampled By: S.Q. & Joey MASSEY

PO No. 14775

AIC No.	Sample Identification	Date/Time Collected	GRAB	COMP	MATRIX WATER	MATRIX SOIL	NO OF BOTTLES
(2)	OUTFALL 002 EFFL. 24HR W.M.P. H.S. W.W.T.P.	8-19-14 TJ 9AM TO 8-20-14 9AM		24 HR	✓		3
		Container Type					
		Preservative					

ANALYSES REQUESTED: CHRONIC BIOMONITORING 3RD QUARTER

AIC CONTROL NO: 181729
AIC PROPOSAL NO:
Carrier: HEBER SPRINGS WATER DEPT.
Received Temperature C: 0.9 °C
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, A=$(NH_4)_2SO_4$, NH_4OH

Turnaround Time Requested: (Please circle)
NORMAL or EXPEDITED IN 7 DAYS
Expedited results requested by: KENT LATCH
Who should AIC contact with questions: SAM QUERRY
Phone: 362-3422 Fax: 501-362-3338
Report Attention to: KENT LATCH
Report Address to: HEBER SPRINGS WATER 1108 WEST FRONT ST. HEBER SPRINGS, ARK. 72543

Relinquished By:	Date/Time	Received By:	Date/Time
Joey Massey	8-2014 11:00AM		
Relinquished By:	Date/Time	Received in Lab By:	Date/Time
		Rawanda Hunt	8/20/14 11:10

Comments:

FORM 0060

AMERICAN INTERPLEX CORPORATION
LABORATORIES

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: Heber Springs Water & Wastewater Dept.
Project Reference: 3rd Quarter Biomonitoring
Project Manager: Kent Latch
Sampled By: S.O. & Joey Masser

PO No. 14776

AIC CONTROL NO: 181729
AIC PROPOSAL NO:
Carrier: Heber Springs Water Dept.
Received Temperature C: 0.4°C

AIC No.	Sample Identification	Date/Time Collected	GRAB	COMP	MATRIX WATER	MATRIX SOIL	NO OF BOTTLES	ANALYSES REQUESTED	Remarks
(3)	OUTFALL 002 (EFF) 24HR. COMP. H.S. W.W.T.P.	3-21-14 TO 8AM 3-22-14 8AM						3RD QUARTER CHRONIC BIOMONITORING	
									Field pH calibration
		Container Type							on _____ @ _____
		Preservative							Buffer:

G = Glass, P = Plastic, V = VOA vials, H = HCl to pH2, T = Sodium Thiosulfate
NO = none, S = Sulfuric acid pH2, N = Nitric acid pH2, B = NaOH to pH12, Z = Zinc acetate, A=$(NH_4)_2SO_4$, NH_4OH

Turnaround Time Requested: (Please circle)
NORMAL or EXPEDITED IN 7 DAYS
Expedited results requested by: Kent Latch
Who should AIC contact with questions: Sam Query
Phone: 362-3422 Fax: 501-362-3336
Report Attention to: Kent Latch
Report Address to: Heber Springs Water Dept. 1108 W. Front St. Heber Springs, AR. 72543

Relinquished By:	Date/Time	Received By:	Date/Time
Sam Query	8-22-14 9:00 AM		
Jon Stanford	8-22-14 10:55 AM		8/22/14 1055

Comments:

FORM 0060

PLACE STICKER AT TOP OF ENVELOPE TO THE RIGHT
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Heber Springs Water & Sewer Dept.
1108 W. Front St.
Heber Springs, AR 72543
PH: 501-362-5501 FAX: 501-362-3338

TO:

ADEQ
5301 Northshore Drive
North Little Rock, AR 72118-5317