

## Sanitary Sewer Overflow Monthly Report

Facility Name: Sheridan Water and Sewer Works Permit Number: AR0034347 Reporting Period(Month/Year): 9-2014

**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 of Adverse Health or Environmental Impact	WO-Work Order	CR-Creek/Stream/River (please specify)
E-Equipment Failure	G-Grease			
HC-Hydro Clean	LF-Line Failure/Break	OBHC-Observed or Evidence of Human Contact	EC-Environmental Cleanup	DI-Ditch
R-Rainfall	RG-Roots & Grease	EFK-Evidence of Fish Kill	HC-Hydro Cleaned	DR-Drop Inlet
RO-Roots	V-Vandalism		HR-Hand Rodded	GR-Ground Surface
			BN-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	Ultimate Discharge Location

Signature of Cognizant or Ranking Official

Date 10-20-14

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 for knowing violations."

# Arkansas Analytical, Inc.

## Toxicity Test Results

**CITY of SHERIDAN**  
**NPDES PERMIT NUMBER: AR0034347**  
**Third Quarter 2014**  
**AFIN # 27-00022**

Fathead Minnow, *Pimephales promelas*, Larval Survival and Growth Test  
Test 1000.0

*Ceriodaphnia dubia*, Survival and Reproduction Test  
Test 1002.0

Prepared for: **Mr. David Fitzgerald**  
**City of Sheridan**  
**P.O.Box 486**  
**Sheridan, Arkansas 72150**

Prepared by: Arkansas Analytical, Inc.  
11701 I-30, Bldg 1, Suite 115  
Little Rock, Arkansas 72209  
**Lab Number K1409011**

Wednesday, October 08, 2014

## **Introduction**

This report contains test results for toxicity testing for the City of Sheridan, NPDES permit number AR0034347. The plant is located in the Southeast  $\frac{1}{4}$  of the Northwest  $\frac{1}{4}$  of Section 11, Township 5 South, Range 13 West, in Grant County, Arkansas. The discharge is to receiving waters named Big Creek to Hurricane Creek, then to the Saline River in Segment 2C of the Ouachita River Basin.

The permit requires chronic biomonitoring testing quarterly for *Ceriodaphnia dubia* and *Pimephales promelas*. The test results in this report represent the testing of the third quarter of 2014.

## **Plant Operations**

To be provided by permittee.

## Source of Effluent and Dilution Water

Effluent sample was collected as follows:

Sample Collection:	Date, Time Started	Date, Time Ended
Sample #1:	9-29-14, 1145	9-29-14, 1145

Only one grab sample was collected due to the cessation of flow.

The following information was collected upon immediate receipt of the samples at the laboratory:

Sample Receiving Information:	Date, Time Sample(s) Received	Temperature Upon Receipt (°C)
Sample #1:	9-29-14, 1338	4

Chain of custody documentation is located in Appendix A.

The permit designates the receiving water to be used as dilution water for the toxicity tests. Synthetic dilution water was substituted because of either zero flow conditions or due to an earlier characterization of the receiving water as being toxic.

The dilution water used in the toxicity tests was synthetic moderately hard. It was prepared using Elga Maxima ultra pure water according to EPA specifications. Each batch was analyzed for pH, hardness, total alkalinity, and conductivity. Results are provided in Appendix B.

### Dilution Series

Five dilutions in addition to a control (0% effluent) were used in the toxicity tests. The dilutions, which were made with synthetic water, were 6%, 8%, 11%, 14%, and 19%. The low-flow effluent concentration (**critical dilution**) was defined as **14% effluent**.

## Test Methods

EPA Method 1000.0, Fathead Minnow, *Pimephales promelas*, Larval Survival and Growth Test, was used in this bioassay. Larvae are exposed in a static renewal system for seven days and the results are based on the survival and growth (increase in weight) of the larvae. The alternate method suggested in the method (11.3.4.5) for combating pathogen interference was run in place of the original fathead minnow test. The test chambers were 30 ml plastic cups with 20 ml of test solution. Each chamber contained 2 organisms. The total number of fish was 40 per test solution. The fish were then combined to perform growth analysis. The test temperature was 25 degrees Centigrade. Raw data and statistics are provided in Appendix C.

EPA Method 1002.0, Cladoceran, *Ceriodaphnia dubia*, Survival and Reproduction Test, was also used. Neonates are exposed in a static renewal system until at least 60% of the control organisms have produced a third brood. Results are based on the survival and reproduction of the organisms. One neonate was placed in each of ten replicate chambers using a randomizing template. Test chambers were 30 ml plastic cups filled with 15 ml of test solution. The test temperature was 25 degrees Centigrade. Raw data and statistics are provided in Appendix D.

## Test Organisms

The organisms used in Test 1000.0 were < 48 hour old Fathead Minnows, *Pimephales promelas*, which were purchased from Aquatox; a copy of the organism history is provided in Appendix D.

The organisms used in Test 1002.0 were < 24 hour old *Ceriodaphnia dubia* neonates, (all born within the same eight hours), obtained from an in-house culture. An organism history is provided in Appendix E

## Quality Assurance

### Test Acceptability

#### TEST ACCEPTANCE CRITERIA for *Pimephales promelas*

Control Criteria	Results	Pass	Fail
Greater than or equal to 80% survival	100%	X	
The percent coefficient of variation between replicates must be 40% or less for survival	0.00%	X	
Minimum of 0.25 mg average dry weight of surviving controls	0.666	X	
The percent coefficient of variation between replicates must be 40% or less for growth	10.5%	X	

#### TEST ACCEPTANCE CRITERIA for *Ceriodaphnia dubia*

Control Criteria	Results	Pass	Fail
Greater than or equal to 80% survival	100%	X	
Average of 15 or more young per surviving female	17.0	X	
At least 60% of surviving females should have produced 3 broods	70%	X	
The percent coefficient of variation between replicates must be 40% or less for the young of surviving females	22.7%	X	

### Reference Toxicant

The reference toxicant used was Potassium Chloride prepared in-house. The tests were performed using moderately hard water as dilution water. The results of the reference toxicant were:

#### REFERENCE TOXICANT

<i>Ceriodaphnia dubia</i> 8/5/14 – 8/12/14		<i>Pimephales promelas</i> 8/5/14 – 8/12/14	
NOEC Survival:	500ppm KCl	NOEC Survival:	500 ppm KCl
LOEC Survival:	1000 ppm KCl	LOEC Survival:	1000 ppm KCl
NOEC Reproduction:	250 ppm KCl	NOEC Growth:	500 ppm KCl
LOEC Reproduction:	500 ppm KCl	LOEC Growth:	1000 ppm KCl

Quality Assurance charts are provided in Appendix E.

### Summary of Results

<i>Ceriodaphnia dubia</i>		<i>Pimephales promelas</i>	
NOEC / LOEC Survival	19% / NA	NOEC / LOEC survival	19% / NA
NOEC / LOEC Reproduction	19% / NA	NOEC / LOEC growth	19% / NA
Mean number of neonates (critical dilution)	17.3	%CV survival (critical dilution)	0.00%
%CV Reproduction (critical dilution)	21.6%	Mean dry weight (critical dilution) in milligrams	0.645
		%CV growth (critical dilution)	7.60%
PMSD Reproduction	25.8%	PMSD Growth	13.5%

#### Conclusion

Chronic static renewal larval survival and growth test using fathead minnow, *Pimephales promelas*, (Method 1000.0)

The permit issued to the City of Sheridan, AR0034347, specifies that the **critical dilution is 14% effluent**. The effluent samples **did not** exhibit lethal or sublethal effects at the critical dilution, and, as such, **passed** the test.

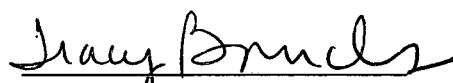
Chronic static renewal survival and reproduction test using *Ceriodaphnia dubia*, (Method 1002.0)

The permit issued to the City of Sheridan, AR0034347, specifies that the **critical dilution is 14% effluent**. The effluent samples **did not** exhibit lethal or sublethal effects at the critical dilution, and, as such, **passed** the test.

Biomonitoring Analysts:

Ryan Hudgin / Kenneth Pigue

Reviewed by:

  
Tracy Bounds, lab manager

SUMMARY REPORTING FORMS FOR CHRONIC BIOMONITORING  
 FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL  
*PIMEPHALES PROMELAS*

PERMITTEE: City of Sheridan

NPDES #: AR0034347

Sample Collection:	Date, Time Started	Date, Time Ended
Sample #1:	9-29-14, 1145	9-29-14, 1145

Test initiated (date, time): 9-30-14, 1400    Test terminated (date, time): 10-7-14, 1030

Dilution water used:    Moderately Hard Synthetic

**DATA TABLE FOR FATHEAD MINNOW SURVIVAL**

Effluent Conc %	Percent Survival in Replicate Chambers						Mean Percent Survival			
	A	B	C	D	E		24 hours	48 hours	7 days	CV %
0%	100	100	100	100	100		100	100	100	0.00%
6%	100	87.5	100	100	100		100	97.5	97.5	
8%	100	100	100	100	100		100	100	100	
11%	100	100	100	100	100		100	100	100	
14%	100	100	100	100	100		100	100	100	0.00%
19%	100	100	100	87.5	100		100	100	97.5	

**DATA TABLE FOR GROWTH OF FATHEAD MINNOWS**

Effluent Conc %	Average Dry Weight in milligrams in replicate chambers						Mean Dry Weight	CV%
	A	B	C	D	E			
0%	0.616	0.650	0.699	0.594	0.769		0.666	10.5%
6%	0.561	0.596	0.575	0.610	0.611		0.591	
8%	0.516	0.659	0.585	0.602	0.681		0.609	
11%	0.565	0.675	0.699	0.520	0.691		0.630	
14%	0.673	0.672	0.680	0.638	0.562		0.645	7.60%
19%	0.616	0.621	0.604	0.529	0.686		0.611	

Coefficient of Variation = standard deviation / mean \* 100



SUMMARY REPORTING FORMS FOR CHRONIC BIOMONITORING  
FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL  
*Pimephales promelas*

1. Dunnett's procedure or Steel's Many-One Rank Test as appropriate:  
Is the mean survival at 7 days significantly different ( $p=0.05$ ) than the control survival for:
  - a) LOW FLOW OR CRITICAL DILUTION, (14.0%)    YES \_\_\_\_\_    NO   X
  
2. Dunnett's Procedure  
Is the mean dry weight (growth) at 7 days significantly different ( $p=0.05$ ) than the control's dry weight (growth) for:
  - a) LOW FLOW OR CRITICAL DILUTION, (14.0%)    YES \_\_\_\_\_    NO   X
  
3. If NO was answered to 1.a) enter [0] otherwise enter [1] (parameter TLP6C):   0
  
4. If NO was answered to 2.a) enter [0] otherwise enter [1] (parameter TGP6C):   0
  
5. Enter percentage corresponding to each parameter below:
  - a) NOEC survival (parameter TOP6C)=   19   % effluent
  - b) NOEC growth (parameter TPP6C)=   19   % effluent
  - c) Coefficient of variation (parameter TQP6C)=   10.5   %

SUMMARY REPORTING FORMS FOR CHRONIC BIOMONITORING  
*Ceriodaphnia dubia* SURVIVAL AND REPRODUCTION

Permittee: City of Sheridan

NPDES #: AR0034347

Sample Collection:	Date, Time Started	Date, Time Ended
Sample #1:	9-29-14, 1145	9-29-14, 1145

Test initiated (date, time): 9-30-14, 1330      Test terminated (date, time): 10-7-14, 1000

Dilution water used:      Moderately Hard Synthetic

*Ceriodaphnia dubia* SURVIVAL AND REPRODUCTION

NUMBER OF YOUNG PRODUCED PER FEMALE @ TEST TERMINATION

PERCENT EFFLUENT

Replicate	0%	6%	8%	11%	14%	19%
A	18	13	25	17	19	11
B	9	17	13	12	15	16
C	12	14	18	7	19	12
D	21	8	16	17	9	19
E	18	17	9	21	18	19
F	17	19	8	14	21	11
G	18	18	21	17	17	11
H	21	18	16	19	20	10
I	16	10	14	13	21	16
J	20	23	13	12	14	20
Mean	17.0	15.7	15.3	14.9	17.3	14.5
Mean/surviving female	17.0	15.7	15.3	14.9	17.3	14.5
CV%*	22.7				21.6	

X= Dead Adult; M= Male (Not considered in statistics)

\*Coefficient of Variation = standard deviation/ mean \* 100; CV% calculation based on young per surviving female

**SUMMARY REPORTING FORMS FOR CHRONIC BIOMONITORING**  
*Ceriodaphnia dubia* SURVIVAL AND REPRODUCTION

**Permittee: City of Sheridan**

**NPDES #: AR0034347**

PERCENT SURVIVAL

PERCENT EFFLUENT	0%	6%	8%	11%	14%	19%
Time of Reading: 24 HOURS	100	100	100	100	100	100
48 HOURS	100	100	100	100	100	100
Test termination	100	100	100	100	100	100

1. Fisher's Exact Test:

Is the mean survival at test termination significantly different (p=0.05) than the control survival for:

a) LOW FLOW OR CRITICAL DILUTION, (36.3%): YES \_\_\_\_\_ NO   X  

2. Dunnett's Procedure or Steel's Many One Rank Test:

Is the mean number of young produced per female significantly different (p=0.05) than the controls number of young per female for:

a) LOW FLOW OR CRITICAL DILUTION, (36.3%): YES \_\_\_\_\_ NO   X  

3. If NO was answered to 1.a) enter [0] otherwise enter [1] (parameter TLP3B):   0  

4. If NO was answered to 2.a) enter [0] otherwise enter [1] (parameter TGP3B):   0  

5. Enter percentage corresponding to each parameter below:

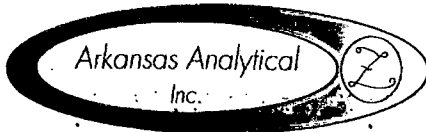
a) NOEC survival (parameter TOP3B)=   19   % effluent

b) NOEC reproduction (parameter TPP3B)=   19   % effluent

c) Coefficient of variation (parameter TQP3B)=   22.7   %

APPENDIX A

Chain of Custody Forms



11701 Interstate 30, Bldg. 1, Ste. 115  
 Little Rock, AR 72209  
 PHONE: 501-455-3233  
 FAX: 501-455-6118

# CHAIN OF CUSTODY RECORD

CLIENT INFORMATION		BILLING INFORMATION		Project Description		Turnaround Time		Preservation Codes:											
Sheridan Waterworks		Sheridan Waterworks		Chronic Toxicity		1 Day (100%)		1. Cool, 4 Degrees Centigrade				4. Thiosulfate for Dechlorination							
104 W High St.		P.O. Box 486				2 Day (50%)		2. Sulfuric Acid (H <sub>2</sub> SO <sub>4</sub> ), pH < 2				5. Hydrochloric Acid(HCl)							
Sheridan, AR 72150		Sheridan, AR 72150		Reporting Information		3 Day (25%)		3. Nitric Acid (HNO <sub>3</sub> ), pH < 2				6. Sodium Hydroxide (NaOH), pH > 12							
Attn: David Fitzgerald				Telephone: 870-942-2722		Routine		TEST PARAMETERS								Bottle Type Code			
				Fax: 870-942-1937		Preservative Code: 1										G = Glass; P = Plastic			
				Email: sheridanwater@windstream.net		Bottle Type: P										V = Septum; A = Amber			
Sampler(s) Signature: <i>Allen Parker</i>				Sampler(s) Printed: <i>Allen Parker</i>				Chronic Toxicity										Arkansas Analytical Work Order Number:	
Field Number	SAMPLE COLLECTION		Grab	Comp	Number of Bottles	Sample Matrix	SAMPLE IDENTIFICATION/ DESCRIPTION												
	9-29-14	0-1145	X			Water	Final Discharge										K14090114		
1. Relinquished by: (Signature)		Date/Time		2. Received by: (Signature)		SAMPLE CONDITION UPON RECEIPT IN LAB				REMARKS / SAMPLE COMMENTS									
<i>Allen Parker</i>		1338 9-29-14		<i>[Signature]</i>		1. CUSTODY SEALS: <input checked="" type="checkbox"/> Yes ___ No 2. CONTAINERS CORRECT: <input checked="" type="checkbox"/> Yes ___ No 3. COC/LABELS AGREE: <input checked="" type="checkbox"/> Yes ___ No 4. RECEIVED ON ICE: <input checked="" type="checkbox"/> Yes ___ No 5. TEMPERATURE ON RECEIPT: 4°C 6. TEMPERATURE GUN ID: HHT #2													
3. Relinquished by: (Signature)		Date/Time		4. Received by lab: (Signature)		FOR COMPLETION BY LAB ONLY													
<i>[Signature]</i>				<i>Sydney James</i>															

APPENDIX B

Effluent and Dilution Water Data

CHEMICAL DATA SHEET FOR CHRONIC TOXICITY TESTING

Fathead Minnow

Lab # / Sample ID K1409011

Test Start (Date/Time)

9-30-14

1400

Client: Shenidan

Test End (Date/Time)

10-7-14

1030

Day of Test

		1	2	3	4	5	6	7	notes
<b>Control</b>	mHS	9-30	10-1	10-2	10-3	10-4	10-5	10-6	
D.O. (mg/L)	INITIAL	8.9	8.8	8.7	8.8	8.8	8.7	8.7	
	FINAL	8.1	8.5	8.4	8.2	8.3	8.3	8.1	
pH (s.u.)	INITIAL	7.9	8.0	7.8	7.7	7.8	8.0	8.1	
	FINAL	8.0	7.8	8.1	7.7	8.0	7.8	8.1	
temp (C)	INITIAL	22	22	22	21	21	20.5	22	
	FINAL	25	25	25	25.0	25.0	25	25	
ALKALINITY (mg/L)		6.4							
HARDNESS (mg/L)		8.6						1	
CONDUCTIVITY (umho)		416							
CHLORINE (mg/L)		0.05							
<b>CONC:</b>	6								
D.O. (mg/L)	INITIAL	8.8	8.7	8.7	8.8	8.8	8.7	8.7	
	FINAL	8.2	8.5	8.4	8.2	8.3	8.3	8.0	
pH (s.u.)	INITIAL	7.7	7.8	7.9	7.7	7.8	8.0	8.1	
	FINAL	7.7	7.7	7.8	7.7	8.0	7.9	7.9	
temp (C)	INITIAL	22	22	22	21	21	20.6	21	
	FINAL	25	25	25	25	25.0	25	25	
<b>CONC:</b>	8								
D.O. (mg/L)	INITIAL	8.8	8.7	8.7	8.8	8.8	8.6	8.7	
	FINAL	8.3	8.5	8.4	8.2	8.3	8.1	8.0	
pH (mg/L)	INITIAL	7.7	7.7	7.8	7.7	7.8	7.9	8.0	
	FINAL	7.7	7.9	7.9	7.7	8.0	8.1	7.8	
temp (C)	INITIAL	22	22	22	21	21	20.7	21	
	FINAL	25	25	25	25	25.0	25	25	
<b>CONC:</b>	11								
D.O. (mg/L)	INITIAL	8.6	8.6	8.6	8.8	8.7	8.6	8.7	
	FINAL	8.4	8.5	8.4	8.1	8.3	8.1	8.0	
pH (s.u.)	INITIAL	7.6	7.9	7.8	7.8	7.8	8.0	8.1	
	FINAL	7.6	7.8	7.9	7.6	8.0	8.1	7.9	
temp (C)	INITIAL	22	22	21	21	21	20.9	21	
	FINAL	25	25	25	25	25.0	25	25	
<b>CONC:</b>	14								
D.O. (mg/L)	INITIAL	8.6	8.7	8.6	8.8	8.7	8.6	8.7	
	FINAL	8.3	8.4	8.5	8.0	8.4	8.2	7.9	
pH (s.u.)	INITIAL	7.6	7.7	7.8	7.8	7.8	8.0	8.1	
	FINAL	7.8	8.0	7.8	7.7	8.0	7.9	7.8	
temp (C)	INITIAL	22	22	21	21	21	21.3	21	
	FINAL	25	25	25	25	25.0	25	25	
<b>CONC:</b>	19								
D.O. (mg/L)	INITIAL	8.7	8.5	8.7	8.8	8.7	8.6	8.7	
	FINAL	8.3	8.5	8.4	8.0	8.4	8.1	7.9	
pH (s.u.)	INITIAL	7.6	7.7	7.6	7.8	7.8	7.9	8.0	
	FINAL	7.6	7.8	7.7	7.7	8.0	8.1	7.7	
temp (C)	INITIAL	22	22	21	21	21	21.6	21	
	FINAL	25	25	25	25	25.0	25	25	
<b>CONC:</b>	100 %								
ALKALINITY (mg/L)		70							
HARDNESS (mg/L)		50						1	
CONDUCTIVITY (umho)		359							
CHLORINE (mg/L)		0.05							

CHEMICAL DATA SHEET FOR CHRONIC TOXICITY TESTING

Ceriodaphnia Dubia

Lab # / Sample ID K1409011

Test Start (Date/Time)

9-30-14

1330

Client: Sheridan

Test End (Date/Time)

10-7-14

1000

Day of Test

		1	2	3	4	5	6	7	notes
<b>Control</b>	K145	9-30	10-1	10-2	10-3	10-4	10-5	10-6	
D.O. (mg/L)	INITIAL	8.9	8.9	8.7	8.8	8.8	8.7	8.7	
	FINAL	8.6	8.5	8.6	8.3	8.4	8.1	8.4	
pH (s.u.)	INITIAL	7.9	8.0	7.8	7.7	7.8	8.0	8.1	
	FINAL	7.9	8.0	7.6	7.7	7.9	8.0	8.0	
temp (C)	INITIAL	22	22	22	21	21	20.5	22	
	FINAL	25	25	25	25	25	25	25	
ALKALINITY (mg/L)		6.4							
HARDNESS (mg/L)		8.6							
CONDUCTIVITY (umhc)		416							
CHLORINE (mg/L)		<0.05							
<b>CONC: 6</b>									
D.O. (mg/L)	INITIAL	8.9	8.7	8.7	8.9	8.8	8.7	8.7	
	FINAL	8.6	8.5	8.6	8.4	8.4	8.2	8.3	
pH (s.u.)	INITIAL	7.7	7.8	7.9	7.7	7.8	8.0	8.1	
	FINAL	7.8	7.7	7.8	7.8	7.9	8.0	8.2	
temp (C)	INITIAL	22	22	22	21	21	20.6	21	
	FINAL	25	25	25	25	25	25	25	
<b>CONC: 8</b>									
D.O. (mg/L)	INITIAL	8.9	8.7	8.7	8.8	8.8	8.6	8.7	
	FINAL	8.5	8.5	8.6	8.4	8.4	8.2	8.3	
pH (mg/L)	INITIAL	7.7	7.7	7.8	7.7	7.8	7.9	8.0	
	FINAL	7.9	7.9	7.7	7.9	7.9	7.8	8.0	
temp (C)	INITIAL	22	22	22	21	21	20.7	21	
	FINAL	25	25	25	25	25	25	25	
<b>CONC: 11</b>									
D.O. (mg/L)	INITIAL	8.6	8.6	8.6	8.8	8.7	8.6	8.7	
	FINAL	8.4	8.4	8.5	8.4	8.3	8.2	8.4	
pH (s.u.)	INITIAL	7.6	7.9	7.8	7.8	7.8	8.0	8.1	
	FINAL	7.7	7.7	7.8	8.0	7.8	8.0	8.0	
temp (C)	INITIAL	22	22	21	21	21	20.9	21	
	FINAL	25	25	25	25	25	25	25	
<b>CONC: 14</b>									
D.O. (mg/L)	INITIAL	8.6	8.7	8.6	8.8	8.7	8.6	8.7	
	FINAL	8.6	8.5	8.5	8.4	8.3	8.2	8.3	
pH (s.u.)	INITIAL	7.6	7.7	7.8	7.8	7.8	8.0	8.1	
	FINAL	7.7	7.9	7.6	8.1	7.8	7.8	8.0	
temp (C)	INITIAL	22	22	22	21	21	21.5	21	
	FINAL	25	25	25	25	25	25	25	
<b>CONC: 19</b>									
D.O. (mg/L)	INITIAL	8.7	8.5	8.7	8.8	8.7	8.6	8.7	
	FINAL	8.4	8.5	8.5	8.4	8.3	8.1	8.3	
pH (s.u.)	INITIAL	7.6	7.7	7.6	7.8	7.8	7.9	8.0	
	FINAL	7.5	7.5	7.7	8.0	8.0	7.7	8.0	
temp (C)	INITIAL	22	22	21	21	21	21.6	21	
	FINAL	25	25	25	25	25	25	25	
<b>CONC: 100 %</b>									
ALKALINITY (mg/L)		7.0							
HARDNESS (mg/L)		5.0							
CONDUCTIVITY (umhc)		359							
CHLORINE (mg/L)		<0.05							



APPENDIX C

Fathead minnow raw data and statistics

SURVIVAL DATA FOR LARVAL SURVIVAL AND GROWTH TEST (ALTERNATE)

LAB #: K1409011	TEST START	DATE	09/30/14	TIME	1400
CLIENT: Sheridan	TEST END	DATE	10/07/14	TIME	1030
ANALYST: RH / KP	AGE AND SOURCE OF MINNOWS				

DAY(NUMBER SURVIVING)											
SURVIVAL											

	REP #	START	1	2	3	4	5	6	7	%	MEAN %	CV
CONTROL	A	8	8	8	8	8	8	8	8	100%	100.0%	0.00
	B	8	8	8	8	8	8	8	8	100%		
	C	8	8	8	8	8	8	8	8	100%		
	D	8	8	8	8	8	8	8	8	100%		
	E	8	8	8	8	8	8	8	8	100%		

	REP #	START	1	2	3	4	5	6	7	%	MEAN %	CV
CONC:	A	8	8	8	8	8	8	8	8	100%	97.5%	
	B	8	8	7	7	7	7	7	7	87.5%		
	C	8	8	8	8	8	8	8	8	100%		
	D	8	8	8	8	8	8	8	8	100%		
	E	8	8	8	8	8	8	8	8	100%		

	REP #	START	1	2	3	4	5	6	7	%	MEAN %	CV
CONC:	A	8	8	8	8	8	8	8	8	100%	100.0%	
	B	8	8	8	8	8	8	8	8	100%		
	C	8	8	8	8	8	8	8	8	100%		
	D	8	8	8	8	8	8	8	8	100%		
	E	8	8	8	8	8	8	8	8	100%		

	REP #	START	1	2	3	4	5	6	7	%	MEAN %	CV
CONC:	A	8	8	8	8	8	8	8	8	100%	100.0%	
	B	8	8	8	8	8	8	8	8	100%		
	C	8	8	8	8	8	8	8	8	100%		
	D	8	8	8	8	8	8	8	8	100%		
	E	8	8	8	8	8	8	8	8	100%		

	REP #	START	1	2	3	4	5	6	7	%	MEAN %	CV
CONC:	A	8	8	8	8	8	8	8	8	100%	100.0%	0.00
	B	8	8	8	8	8	8	8	8	100%		
	C	8	8	8	8	8	8	8	8	100%		
	D	8	8	8	8	8	8	8	8	100%		
	E	8	8	8	8	8	8	8	8	100%		

	REP #	START	1	2	3	4	5	6	7	%	MEAN %	CV
CONC:	A	8	8	8	8	8	8	8	8	100%	97.5%	
	B	8	8	8	8	8	8	8	8	100%		
	C	8	8	8	8	8	8	8	8	100%		
	D	8	8	8	8	8	7	7	7	87.5%		
	E	8	8	8	8	8	8	8	8	100%		

ANALYST:		RH	RH	RH	RH	KP	KP	RH	RH			
DATE:		9/30/14	10/1/14	10/2/14	10/3/14	10/4/14	10/5/14	10/6/14	10/7/14			
TIME:		1400	1430	1340	1030	1000	1130	1120	1030			

CV= PERCENT COEFFICIENT OF VARIATION: STANDARD DEVIATION/MEAN \* 100

REMARKS:

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AA# K1409011, FATHEAD MINNOW SURVIVAL, CHRONIC, 9-30-14

File: C:\COPYTO~1\TOXSTAT\FHSURV~1.

Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

---

D = 0.054

W = 0.547

Critical W (P = 0.05) (n = 30) = 0.927

Critical W (P = 0.01) (n = 30) = 0.900

---

Data FAIL normality test. Try another transformation.

Warning - The first three homogeneity tests are sensitive to non-normal data and should not be performed.

AA# K1409011, FATHEAD MINNOW SURVIVAL, CHRONIC, 9-30-14

File: C:\COPYTO~1\TOXSTAT\FHSURV~1.

Transform: ARC SINE(SQUARE ROOT(Y))

Hartley's test for homogeneity of variance

Bartlett's test for homogeneity of variance

---

These two tests can not be performed because at least one group has zero variance.

Data FAIL to meet homogeneity of variance assumption.

Additional transformations are useless.

---

TITLE: AA# K1409011, FATHEAD MINNOW SURVIVAL, CHRONIC, 9-30-14  
 FILE: C:\COPYTO~1\TOXSTAT\FHSURV~1.  
 TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	1.0000	1.3931
1	CONTROL	2	1.0000	1.3931
1	CONTROL	3	1.0000	1.3931
1	CONTROL	4	1.0000	1.3931
1	CONTROL	5	1.0000	1.3931
2	6 % EFFLUENT	1	1.0000	1.3931
2	6 % EFFLUENT	2	0.8750	1.2094
2	6 % EFFLUENT	3	1.0000	1.3931
2	6 % EFFLUENT	4	1.0000	1.3931
2	6 % EFFLUENT	5	1.0000	1.3931
3	8 % EFFLUENT	1	1.0000	1.3931
3	8 % EFFLUENT	2	1.0000	1.3931
3	8 % EFFLUENT	3	1.0000	1.3931
3	8 % EFFLUENT	4	1.0000	1.3931
3	8 % EFFLUENT	5	1.0000	1.3931
4	11 % EFFLUENT	1	1.0000	1.3931
4	11 % EFFLUENT	2	1.0000	1.3931
4	11 % EFFLUENT	3	1.0000	1.3931
4	11 % EFFLUENT	4	1.0000	1.3931
4	11 % EFFLUENT	5	1.0000	1.3931
5	14 % EFFLUENT	1	1.0000	1.3931
5	14 % EFFLUENT	2	1.0000	1.3931
5	14 % EFFLUENT	3	1.0000	1.3931
5	14 % EFFLUENT	4	1.0000	1.3931
5	14 % EFFLUENT	5	1.0000	1.3931
6	19 % EFFLUENT	1	1.0000	1.3931
6	19 % EFFLUENT	2	1.0000	1.3931
6	19 % EFFLUENT	3	1.0000	1.3931
6	19 % EFFLUENT	4	0.8750	1.2094
6	19 % EFFLUENT	5	1.0000	1.3931

AA# K1409011, FATHEAD MINNOW SURVIVAL, CHRONIC, 9-30-14  
 File: C:\COPYTO~1\TOXSTAT\FHSURV~1. Transform: ARC SINE(SQUARE ROOT(Y))

STEEL'S MANY-ONE RANK TEST - Ho: Control < Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	1.393				
2	6 % EFFLUENT	1.356	25.00	16.00	5.00	
3	8 % EFFLUENT	1.393	27.50	16.00	5.00	
4	11 % EFFLUENT	1.393	27.50	16.00	5.00	
5	14 % EFFLUENT	1.393	27.50	16.00	5.00	
6	19 % EFFLUENT	1.356	25.00	16.00	5.00	

Critical values use k = 5, are 1 tailed, and alpha = 0.05

*Pimephales promelas*

**FATHEAD MINNOW**

TEST 1000.0

**WEIGHT DATA FOR LARVAL SURVIVAL AND GROWTH TEST**

LAB # / #s:		K1409011		TEST DATES (BEGIN / END):		9/30/14 - 10/7/14	
CLIENT:		Sheridan		WEIGHING DATE / TIME:		10/8/2014 1030	
ANALYSTS:		RH		DRYING TEMP (DEGREES C):		60	
SAMPLE ID:				DRYING TIME (HOURS):		24	
	REP #	FINAL DRY WEIGHT TIN+LARVAE (g)	INITIAL WEIGHT TIN (g)	TOTAL DRY WEIGHT OF LARVAE (g)	NUMBER OF LARVAE	DRY WEIGHT OF LARVAE (mg)	
CONTROL	A	0.99086	0.98593	0.00493	8	0.616	AVG DRY WEIGHT (mg)
	B	0.97870	0.97350	0.00520	8	0.650	
	C	1.01737	1.01178	0.00559	8	0.699	0.666
	D	1.03816	1.03341	0.00475	8	0.594	CV
	E	1.02125	1.01510	0.00615	8	0.769	
6%	A	0.97582	0.97133	0.00449	8	0.561	AVG DRY WEIGHT (mg)
	B	1.02008	1.01531	0.00477	8	0.596	
	C	0.98184	0.97724	0.00460	8	0.575	0.591
	D	1.00760	1.00272	0.00488	8	0.610	CV
	E	0.99094	0.98605	0.00489	8	0.611	
8%	A	0.99131	0.98718	0.00413	8	0.516	AVG DRY WEIGHT (mg)
	B	1.00113	0.99586	0.00527	8	0.659	
	C	1.02189	1.01721	0.00468	8	0.585	0.609
	D	0.98744	0.98262	0.00482	8	0.602	CV
	E	1.00206	0.99661	0.00545	8	0.681	
11%	A	1.00786	1.00334	0.00452	8	0.565	AVG DRY WEIGHT (mg)
	B	0.96033	0.95493	0.00540	8	0.675	
	C	0.98892	0.98333	0.00559	8	0.699	0.630
	D	0.99706	0.99290	0.00416	8	0.520	CV
	E	0.99818	0.99265	0.00553	8	0.691	
14%	A	0.99336	0.98798	0.00538	8	0.673	AVG DRY WEIGHT (mg)
	B	1.01290	1.00752	0.00538	8	0.672	
	C	1.01176	1.00632	0.00544	8	0.680	0.645
	D	1.00072	0.99562	0.00510	8	0.638	CV
	E	0.99066	0.98616	0.00450	8	0.562	
19%	A	1.01153	1.00660	0.00493	8	0.616	AVG DRY WEIGHT (mg)
	B	0.97942	0.97445	0.00497	8	0.621	
	C	1.01091	1.00608	0.00483	8	0.604	0.611
	D	0.98343	0.97920	0.00423	8	0.529	CV
	E	1.00775	1.00226	0.00549	8	0.686	

CV = (STANDARD DEVIATION/MEAN)\*100

REMARKS:

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AA# K1409011, FATHEAD MINNOW GROWTH CHRONIC, 9-30-14

File: C:\COPYTO~1\TOXSTAT\FHGWGROWTH.

Transform: NO TRANSFORMATION

Shapiro - Wilk's test for normality

---

D = 0.088

W = 0.971

Critical W (P = 0.05) (n = 30) = 0.927

Critical W (P = 0.01) (n = 30) = 0.900

---

Data PASS normality test at P=0.01 level. Continue analysis.

AA# K1409011, FATHEAD MINNOW GROWTH CHRONIC, 9-30-14

File: C:\COPYTO~1\TOXSTAT\FHGWGROWTH.

Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance

Calculated B1 statistic = 5.56

---

Table Chi-square value = 15.09 (alpha = 0.01, df = 5)

Table Chi-square value = 11.07 (alpha = 0.05, df = 5)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

TITLE: AA# K1409011, FATHEAD MINNOW GROWTH CHRONIC, 9-30-14  
 FILE: C:\COPYTO~1\TOXSTAT\FHGWGROWTH.  
 TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	0.6160	0.6160
1	CONTROL	2	0.6500	0.6500
1	CONTROL	3	0.6990	0.6990
1	CONTROL	4	0.5940	0.5940
1	CONTROL	5	0.7690	0.7690
2	6 % EFFLUENT	1	0.5610	0.5610
2	6 % EFFLUENT	2	0.5960	0.5960
2	6 % EFFLUENT	3	0.5750	0.5750
2	6 % EFFLUENT	4	0.6100	0.6100
2	6 % EFFLUENT	5	0.6110	0.6110
3	8 % EFFLUENT	1	0.5160	0.5160
3	8 % EFFLUENT	2	0.6590	0.6590
3	8 % EFFLUENT	3	0.5850	0.5850
3	8 % EFFLUENT	4	0.6020	0.6020
3	8 % EFFLUENT	5	0.6810	0.6810
4	11 % EFFLUENT	1	0.5650	0.5650
4	11 % EFFLUENT	2	0.6750	0.6750
4	11 % EFFLUENT	3	0.6990	0.6990
4	11 % EFFLUENT	4	0.5200	0.5200
4	11 % EFFLUENT	5	0.6910	0.6910
5	14 % EFFLUENT	1	0.6730	0.6730
5	14 % EFFLUENT	2	0.6720	0.6720
5	14 % EFFLUENT	3	0.6800	0.6800
5	14 % EFFLUENT	4	0.6380	0.6380
5	14 % EFFLUENT	5	0.5620	0.5620
6	19 % EFFLUENT	1	0.6160	0.6160
6	19 % EFFLUENT	2	0.6210	0.6210
6	19 % EFFLUENT	3	0.6040	0.6040
6	19 % EFFLUENT	4	0.5290	0.5290
6	19 % EFFLUENT	5	0.6860	0.6860

AA# K1409011, FATHEAD MINNOW GROWTH CHRONIC, 9-30-14  
 File: C:\COPYTO~1\TOXSTAT\FHGWGROWTH. Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.019	0.004	1.018
Within (Error)	24	0.088	0.004	
Total	29	0.106		

Critical F value = 2.62 (0.05,5,24)  
 Since F < Critical F FAIL TO REJECT Ho: All equal

AA# K1409011, FATHEAD MINNOW GROWTH CHRONIC, 9-30-14

File: C:\COPYTO~1\TOXSTAT\FHGWGROWTH.

Transform: NO TRANSFORMATION

DUNNETT'S TEST - TABLE 1 OF 2

Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	0.666	0.666		
2	6 % EFFLUENT	0.591	0.591	1.963	
3	8 % EFFLUENT	0.609	0.609	1.492	
4	11 % EFFLUENT	0.630	0.630	0.932	
5	14 % EFFLUENT	0.645	0.645	0.539	
6	19 % EFFLUENT	0.611	0.611	1.424	

Dunnett table value = 2.36 (1 Tailed Value, P=0.05, df=24,5)

AA# K1409011, FATHEAD MINNOW GROWTH CHRONIC, 9-30-14

File: C:\COPYTO~1\TOXSTAT\FHGWGROWTH.

Transform: NO TRANSFORMATION

DUNNETT'S TEST - TABLE 2 OF 2

Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	CONTROL	5			
2	6 % EFFLUENT	5	0.090	13.5	0.075
3	8 % EFFLUENT	5	0.090	13.5	0.057
4	11 % EFFLUENT	5	0.090	13.5	0.036
5	14 % EFFLUENT	5	0.090	13.5	0.021
6	19 % EFFLUENT	5	0.090	13.5	0.054



APPENDIX D

*Ceriodaphnia dubia* Raw Data and Statistics



AA # K1409011, C.DUBIA CHRONIC, REPRODUCCION, 9-30-14

File: C:\COPYTO~1\TOXSTAT\C.DUB

Transform: NO TRANSFORMATION

Shapiro - Wilk's test for normality

---

\*\*\*\*\* Shapiro - Wilk's Test is aborted \*\*\*\*\*

This test can not be performed because total number of replicates is greater than 50.

Total number of replicates = 60

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AA # K1409011, C.DUBIA CHRONIC, REPRODUCCION, 9-30-14

File: C:\COPYTO~1\TOXSTAT\C.DUB

Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance

Calculated B1 statistic = 1.33

---

Table Chi-square value = 15.09 (alpha = 0.01, df = 5)

Table Chi-square value = 11.07 (alpha = 0.05, df = 5)

Data PASS B1 homogeneity test at 0.01 level. Continue analysis.

FISHER'S EXACT TEST

IDENTIFICATION	NUMBER OF		
	ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
6	10	0	10
TOTAL	20	0	20

CRITICAL FISHER'S VALUE (10,10,10) ( $p=0.05$ ) 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	NUMBER OF		
	ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
8	10	0	10
TOTAL	20	0	20

CRITICAL FISHER'S VALUE (10,10,10) ( $p=0.05$ ) 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	NUMBER OF		
	ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
11	10	0	10

TOTAL 20 0 20

CRITICAL FISHER'S VALUE (10,10,10) (p=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	NUMBER OF		
	ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
14	10	0	10
TOTAL	20	0	20

CRITICAL FISHER'S VALUE (10,10,10) (p=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	NUMBER OF		
	ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
19	10	0	10
TOTAL	20	0	20

CRITICAL FISHER'S VALUE (10,10,10) (p=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 TESTS

NUMBER NUMBER SIG

GROUP	IDENTIFICATION	EXPOSED	DEAD	(P=.05)
	CONTROL	10	0	
1	6	10	0	
2	8	10	0	
3	11	10	0	
4	14	10	0	
5	19	10	0	

TITLE: AA # K1409011, C.DUBIA CHRONIC, REPRODUCTION, 9-30-14  
FILE: C:\COPYTO~1\TOXSTAT\C.DUB  
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	18.0000	18.0000
1	CONTROL	2	9.0000	9.0000
1	CONTROL	3	12.0000	12.0000
1	CONTROL	4	21.0000	21.0000
1	CONTROL	5	18.0000	18.0000
1	CONTROL	6	17.0000	17.0000
1	CONTROL	7	18.0000	18.0000
1	CONTROL	8	21.0000	21.0000
1	CONTROL	9	16.0000	16.0000
1	CONTROL	10	20.0000	20.0000
2	6 % EFFLUENT	1	13.0000	13.0000
2	6 % EFFLUENT	2	17.0000	17.0000
2	6 % EFFLUENT	3	14.0000	14.0000
2	6 % EFFLUENT	4	8.0000	8.0000
2	6 % EFFLUENT	5	17.0000	17.0000
2	6 % EFFLUENT	6	19.0000	19.0000
2	6 % EFFLUENT	7	18.0000	18.0000
2	6 % EFFLUENT	8	18.0000	18.0000
2	6 % EFFLUENT	9	10.0000	10.0000
2	6 % EFFLUENT	10	23.0000	23.0000
3	8 % EFFLUENT	1	25.0000	25.0000
3	8 % EFFLUENT	2	13.0000	13.0000
3	8 % EFFLUENT	3	18.0000	18.0000
3	8 % EFFLUENT	4	16.0000	16.0000
3	8 % EFFLUENT	5	9.0000	9.0000
3	8 % EFFLUENT	6	8.0000	8.0000
3	8 % EFFLUENT	7	21.0000	21.0000
3	8 % EFFLUENT	8	16.0000	16.0000
3	8 % EFFLUENT	9	14.0000	14.0000
3	8 % EFFLUENT	10	13.0000	13.0000
4	11 % EFFLUENT	1	17.0000	17.0000
4	11 % EFFLUENT	2	12.0000	12.0000
4	11 % EFFLUENT	3	7.0000	7.0000
4	11 % EFFLUENT	4	17.0000	17.0000
4	11 % EFFLUENT	5	21.0000	21.0000
4	11 % EFFLUENT	6	14.0000	14.0000
4	11 % EFFLUENT	7	17.0000	17.0000
4	11 % EFFLUENT	8	19.0000	19.0000

4	11 % EFFLUENT	9	13.0000	13.0000
4	11 % EFFLUENT	10	12.0000	12.0000
5	14 % EFFLUENT	1	19.0000	19.0000
5	14 % EFFLUENT	2	15.0000	15.0000
5	14 % EFFLUENT	3	19.0000	19.0000
5	14 % EFFLUENT	4	9.0000	9.0000
5	14 % EFFLUENT	5	18.0000	18.0000
5	14 % EFFLUENT	6	21.0000	21.0000
5	14 % EFFLUENT	7	17.0000	17.0000
5	14 % EFFLUENT	8	20.0000	20.0000
5	14 % EFFLUENT	9	21.0000	21.0000
5	14 % EFFLUENT	10	14.0000	14.0000
6	19 % EFFLUENT	1	11.0000	11.0000
6	19 % EFFLUENT	2	16.0000	16.0000
6	19 % EFFLUENT	3	12.0000	12.0000
6	19 % EFFLUENT	4	19.0000	19.0000
6	19 % EFFLUENT	5	19.0000	19.0000
6	19 % EFFLUENT	6	11.0000	11.0000
6	19 % EFFLUENT	7	11.0000	11.0000
6	19 % EFFLUENT	8	10.0000	10.0000
6	19 % EFFLUENT	9	16.0000	16.0000
6	19 % EFFLUENT	10	20.0000	20.0000

AA # K1409011, C.DUBIA CHRONIC, REPRODUCCION, 9-30-14  
 File: C:\COPYTO~1\TOXSTAT\C.DUB Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	64.483	12.897	0.718
Within (Error)	54	969.700	17.957	
Total	59	1034.183		

Critical F value = 2.45 (0.05,5,40)  
 Since F < Critical F FAIL TO REJECT Ho: All equal

AA # K1409011, C.DUBIA CHRONIC, REPRODUCCION, 9-30-14  
 File: C:\COPYTO~1\TOXSTAT\C.DUB Transform: NO TRANSFORMATION

DUNNETT'S TEST - TABLE 1 OF 2 Ho: Control < Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	17.000	17.000		
2	6 % EFFLUENT	15.700	15.700	0.686	
3	8 % EFFLUENT	15.300	15.300	0.897	
4	11 % EFFLUENT	14.900	14.900	1.108	
5	14 % EFFLUENT	17.300	17.300	-0.158	
6	19 % EFFLUENT	14.500	14.500	1.319	

Dunnett table value = 2.31 (1 Tailed Value, P=0.05, df=40,5)

AA # K1409011, C.DUBIA CHRONIC, REPRODUCTION, 9-30-14  
File: C:\COPYTO~1\TOXSTAT\C.DUB Transform: NO TRANSFORMATION

DUNNETT'S TEST - TABLE 2 OF 2 Ho:Control<Treatment

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	CONTROL	10			
2	6 % EFFLUENT	10	4.378	25.8	1.300
3	8 % EFFLUENT	10	4.378	25.8	1.700
4	11 % EFFLUENT	10	4.378	25.8	2.100
5	14 % EFFLUENT	10	4.378	25.8	-0.300
6	19 % EFFLUENT	10	4.378	25.8	2.500



APPENDIX E

Organism History

10/2

# AQUATOX, INC.

416 TWIN POINTS ROAD  
HOT SPRINGS, ARKANSAS 71913  
501-520-0560

## TEST ORGANISM HISTORY

DATE SHIPPED 9/20/14 CLIENT Ar Analytical  
Reyn

Purchase Order #: \_\_\_\_\_

SPECIES: Pimephales promelas

Quantity Shipped: 400+

Age: hatched 9/28/14 15-1600  
CST

Brood Stock Source: Anderson Farms, AR

Culture Water: Groundwater

Hardness (Mg/l CaCO<sub>3</sub>): 160

Dissolved Oxygen (Mg/l): 8.1

Temperature (°C): 25.1°C

Feeding: ART

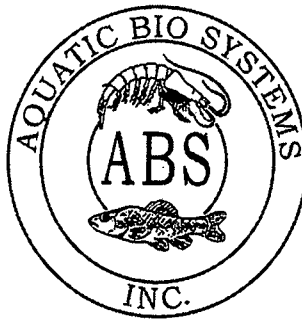
Comments: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_

Shipped Via: Federal Express UPS Overnight Shuttle

Packaged By: \_\_\_\_\_

1300 Blue Spruce Drive, Suite C  
Fort Collins, Colorado 80524



Toll Free: 800/331-5916  
Tel: 970/484-5091 Fax: 970/484-2514

### ORGANISM HISTORY

DATE: 11/25/2013

SPECIES: Ceriodaphnia dubia

AGE: > 3 day

LIFE STAGE: Adult

HATCH DATE: Variable

BEGAN FEEDING: Immediately

FOOD: YTC, Selenastrum sp.

### Water Chemistry Record:

	Current	Range
TEMPERATURE:	<u>22°C</u>	<u>22-26°C</u>
SALINITY/CONDUCTIVITY:	<u>--</u>	<u>--</u>
TOTAL HARDNESS (as CaCO <sub>3</sub> ):	<u>94 mg/l</u>	<u>76-130 mg/l</u>
TOTAL ALKALINITY (as CaCO <sub>3</sub> ):	<u>65 mg/l</u>	<u>65-100 mg/l</u>
pH:	<u>7.98</u>	<u>7.50-8.20</u>

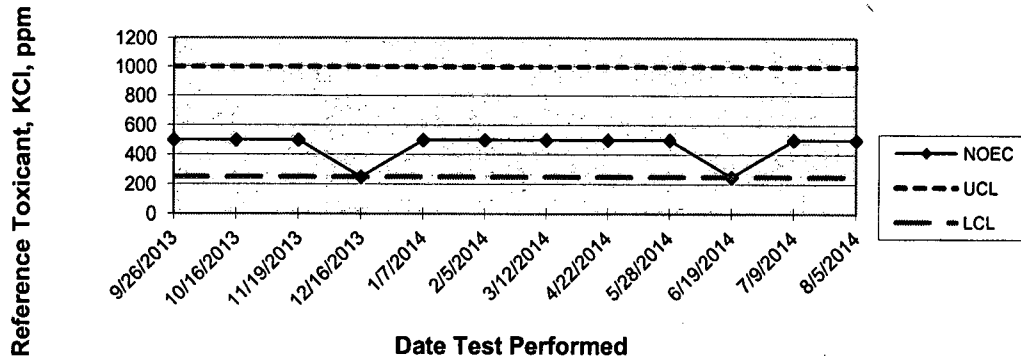
Comments:

  
\_\_\_\_\_  
Facility Supervisor

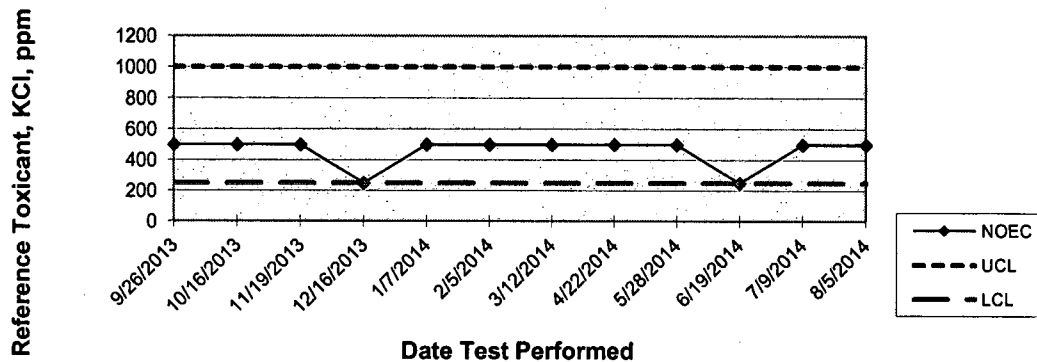
APPENDIX F

Quality Assurance Charts

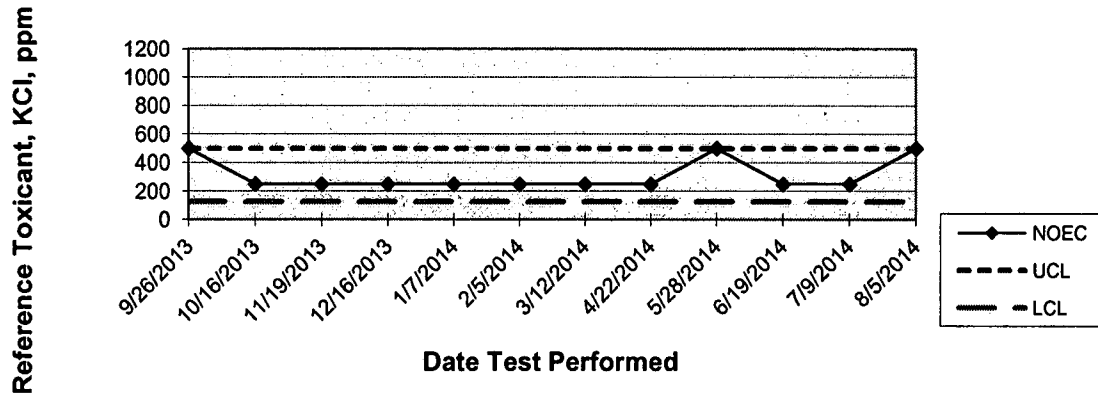
**ARKANSAS ANALYTICAL, INC.**  
**FATHEAD MINNOW SURVIVAL 7 Day**  
**QUALITY ASSURANCE**



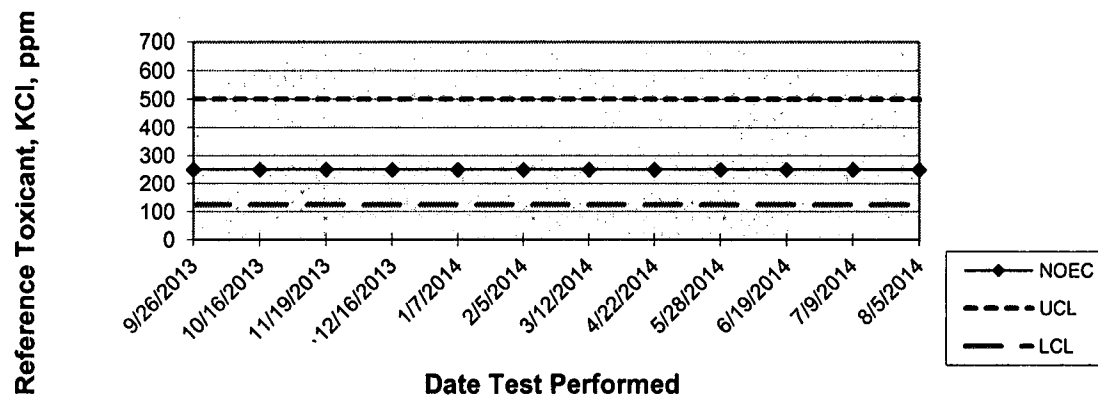
**ARKANSAS ANALYTICAL, INC.**  
**FATHEAD MINNOW GROWTH 7 Day**  
**QUALITY ASSURANCE**



**ARKANSAS ANALYTICAL, INC.**  
**CERIODAPHNIA DUBIA SURVIVAL**  
**QUALITY ASSURANCE**



**ARKANSAS ANALYTICAL, INC.**  
**CERIODAPHNIA DUBIA REPRODUCTION**  
**QUALITY ASSURANCE**



Sheridan Water Works  
PO Box 486  
Sheridan, AR 72150-0486



ADEQ Enforcemnet Branch  
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No Little Rock, AR 72118-5317