Arkansas Analytical, Inc.

Toxicity Test Results

MAGCOBAR MINE SITE
NPDES PERMIT NUMBER: AR0049794
June, 2011
AFIN# 00-00348

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 Friedman**
EEMA O&M Services Group
P.O. Box 232
Kulpsville, PA 19443

Prepared by: Arkansas Analytical, Inc.
11701 I-30, Bldg 1, Suite 115
Little Rock, Arkansas 72209
Lab Number K1106008

Monday, June 27, 2011

Introduction

This report contains test results for toxicity testing for the Magcobar Mine Site. The NPDES permit number is AR0049794. The facility is located one mile northeast of Magnet Cove in Sections 10, 11, 14, & 15, Township 3 South, Range 17 West in Hot Springs County, Arkansas. The facility discharges into Chamberlain Creek, thence to Cove Creek, thence to Ouachita River in Segment 2F of the Ouachita River Basin.

The permit requires chronic biomonitoring testing bi-monthly for both *Ceriodaphnia dubia* and *Pimephales promelas*. The test results in this report represent the testing for June of 2011.

Plant Operations

To be provided by permittee.

Source of Effluent and Dilution Water

Effluent samples were collected as follows:

Sample Collection:	Date, Time Started	Date, Time Ended
Sample #1:	6-15-11, 0720	6-16-11, 0720
Sample #2:	6-16-11, 0850	6-17-11, 0850
Sample #3:	6-20-11, 0920	6-21-11, 0920

The samples were composites collected at the final discharge from the Magcobar mine site.

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:	6-16-11, 1257	3
Sample #2:	6-17-11, 1418	4
Sample #3:	6-21-11, 1432	2

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 either because zero flow conditions existed or due to an earlier characterization of the receiving water as being toxic.

Each sample 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 32%, 42%, 56%, 75%, and 100%. The low-flow effluent concentration (**critical dilution**) was defined as **100% 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 < 24 hour old Fathead Minnows, *Pimephales promelas*, which were purchased from Aquatox; a copy of the organism history is provided in Appendix E.

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 *Ceriodaphnia dubia*

Control Criteria	Results	Pass	Fail
Greater than or equal to 80% survival	90%	X	
Average of 15 or more young per surviving female	17.6	X	
At least 60% of surviving females should have produced 3 broods	100%	X	
The percent coefficient of variation between replicates must be 40% or less for the young of surviving females	11.1%	X	

TEST ACCEPTANCE CRITERIA for *Pimephales promelas*

Control Criteria	Results	Pass	Fail
Greater than or equal to 80% survival	90%	X	
The percent coefficient of variation between replicates must be 40% or less for survival	15.2%	X	
Minimum of 0.25 mg average dry weight of surviving controls	0.386	X	
The percent coefficient of variation between replicates must be 40% or less for growth	3.58%	X	

Reference Toxicant

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

REFERENCE TOXICANT

Ceriodaphnia dubia 6/2-9/11		*Pimephales promelas* 6/2-9/11	
NOEC Survival:	500 ppm 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 F.

Summary of Results
Magcobar Mine Site

Ceriodaphnia dubia		*Pimephales promelas*	
NOEC / LOEC Survival	100% / NA	NOEC / LOEC survival	100% / NA
NOEC / LOEC Reproduction	100% / NA	NOEC / LOEC growth	100% / NA
Mean number of neonates (critical dilution)	19.1	%CV survival (critical dilution)	7.21%
%CV Reproduction (critical dilution)	15.1%	Mean dry weight (critical dilution) in milligrams	0.523
		%CV growth (critical dilution)	12.7%
PMSD Reproduction	24.7	PMSD Growth	16.4

Conclusion

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

The permit issued to the Magcobar Mine Site, AR0049794, specifies that the **critical dilution is 100% effluent**. The effluent samples did not exhibit lethal effects or sublethal effects at the critical dilution, and, as such, **passed** both portions of the test.

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

The permit issued to the Magcobar Mine Site, AR0049794, specifies that the **critical dilution is 100% effluent**. The effluent samples did not exhibit lethal or sublethal effects at the critical dilution, and, as such, **passed** both the portions of the test.

Biomonitoring Analysts:

Ken Pigue

Kenneth Rood

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

PERMITTEE: Magcobar Mine Site **NPDES #: AR0049794**

Sample Collection:	Date, Time Started	Date, Time Ended
Sample #1:	6-15-11, 0720	6-16-11, 0720
Sample #2:	6-16-11, 0850	6-17-11, 0850
Sample #3:	6-20-11, 0920	6-21-11, 0920

Test initiated (date, time): 6-16-11, 1530 Test terminated (date, time): 6-23-11, 0950

Dilution water used: Soft Synthetic

DATA TABLE FOR FATHEAD MINNOW SURVIVAL

Percent Survival in Replicate Chambers **Mean Percent Survival**

DATA TABLE FOR GROWTH OF FATHEAD MINNOWS

Effluent Conc %	A	B	C	D	E		24 hours	48 hours	7 days	CV %
0%	75	100	100	75	100		100	95	90	15.2
32%	100	87.5	100	100	100		100	97.5	97.5	
42%	100	87.5	100	75	87.5		100	95	90	
56%	87.5	100	100	100	87.5		100	97.5	95	
75%	87.5	100	100	100	100		100	100	97.5	
100%	87.5	87.5	100	100	100		100	97.5	95	7.21

SUMMARY

Effluent Conc %	A	B	C	D	E		Mean Dry Weight	CV%
0%	0.396	0.387	0.399	0.364	0.386		0.386	3.58
32%	0.418	0.393	0.510	0.436	0.392		0.430	
42%	0.491	0.446	0.454	0.460	0.429		0.456	
56%	0.480	0.459	0.473	0.378	0.462		0.450	
75%	0.399	0.511	0.458	0.519	0.508		0.479	
100%	0.495	0.459	0.476	0.611	0.575		0.523	12.7

Coefficient of Variation = standard deviation / mean * 100

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, (100%) 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, (100%) 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)= _____**100**___% effluent

   b) NOEC growth (parameter TPP6C)= _____**100**____% effluent

   c) Coefficient of variation (parameter TQP6C)= _____**12.7**_____%

SUMMARY REPORTING FORMS FOR CHRONIC BIOMONITORING
Ceriodaphnia dubia SURVIVAL AND REPRODUCTION

Permittee: Magcobar Mine Site **NPDES #: AR0049794**

Sample Collection:	Date, Time Started	Date, Time Ended
Sample #1:	6-15-11, 0720	6-16-11, 0720
Sample #2:	6-16-11, 0850	6-17-11, 0850
Sample #3:	6-20-11, 0920	6-21-11, 0920

Test initiated (date, time): 6-16-11, 1620 Test terminated (date, time): 6-23-11, 0805

Dilution water used: Soft Synthetic

Ceriodaphnia dubia SURVIVAL AND REPRODUCTION
NUMBER OF YOUNG PRODUCED PER FEMALE @ TEST TERMINATION
PERCENT EFFLUENT

Replicate	0%	32%	42%	56%	75%	100%
A	20	17	17	16	28	12
B	14	21	20	14	16	21
C	17	18	18	21	19	21
D	18	14	19	14	17	19
E	16	23	11	15	13	18
F	17	22	11	11	21	19
G	17	10	27	17	24	20
H	x7	17	20	12	22	19
I	20	11	16	17	15	23
J	19	20	19	16	22	19
Mean	16.5	17.3	17.8	15.3	19.7	19.1
Mean/surviving female	17.6	17.3	17.8	15.3	19.7	19.1
CV%*	11.1					15.1

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: Magcobar Mine Site **NPDES #: AR0049794**

PERCENT SURVIVAL

PERCENT EFFLUENT	0%	32%	42%	56%	75%	100%
Time of Reading: 24 HOURS	100	100	100	100	100	100
48 HOURS	100	100	100	100	100	100
Test termination	90	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, (100%): 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, (100%): 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)= _____**100**____ % effluent

   b) NOEC reproduction (parameter TPP3B)= _____**100**_____% effluent

   c) Coefficient of variation (parameter TQP3B)= _____**15.1**_____%

APPENDIX A

Chain of Custody Forms

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

CHAIN OF CUSTODY R

CLIENT INFORMATION		Project Description	Turnaround Time	Preservation Co
EEMA O & M Services Group	EEMA O & M Services Group	Magcobar Mine Site	24 Hour	1. Cool, 4 Degrees Centigrade
Magcobar Mine Site	P.O. Box 732	Biomonitoring Sample	48 Hour	2. Sulfuric Acid (H_2SO_4), pH < 2
P.O. Box 699	Kulpsville, PA 19443	Reporting Information	72 Hour	3. Nitric Acid (HNO_3), pH < 2
Malvern, AR 72104		Telephone: 501-467-8355	Routine (5 Day)	
Attn: Bill McAlister	Attn: Amber Rich	Fax: 501-467-8687	Preservative Code:	1
		Email: dave.friedman@eema-inc.com; bmcalister@eema-inc.com; bhorton@eema-inc.com	Bottle Type:	P

Sampler(s) Signature: Bill McAlister

Sampler(s) Printed: Bill McAlister

Field Number	SAMPLE COLLECTION Date/s	Time/s	Grab	Comp	Number of Bottles	Sample Matrix	SAMPLE IDENTIFICATION/ DESCRIPTION	Chronic Biomonitoring	TEST PARAMETER
FD-1 Comp.	6/16/2011	7:20 AM		X	4	W	Facility Discharge	X	

1. Relinquished by: (Signature)	Date/Time	2. Received by: (Signature)	SAMPLE CONDITION UPON RECEIPT IN LAB	REMARKS / S
Bill McAlister	6-16-11 1257		1. CUSTODY SEALS: ✓ Yes ___ No	
			2. CONTAINERS CORRECT: ___ Yes ___ No	
			3. COC/LABELS AGREE: ___ Yes ___ No	
3. Relinquished by: (Signature)	Date/Time	4. Received by lab: (Signature)	4. PRESERVATION CONFIRMED: ___ Yes ___ No	
		Sydney James	5. RECEIVED ON ICE: ___ Yes ___ No	
			6. TEMPERATURE ON RECEIPT: 3°C	
			FOR COMPLETION BY LAB ONLY	

Arkansas Analytical Inc.
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Little Rock, AR 72209
PHONE: 501-455-3233
FAX: 501-455-6118

CHAIN OF CUSTODY R

CLIENT INFORMATION		Project Description	Turnaround Time	Preservation Coc
EEMA O & M Services Group	EEMA O & M Services Group	Magcobar Mine Site	24 Hour	1. Cool, 4 Degrees Centigrade
Magcobar Mine Site	P.O. Box 732	Biomonitoring Sample	48 Hour	2. Sulfuric Acid (H_2SO_4), pH < 2
P.O. Box 699	Kulpsville, PA 19443	Reporting Information	72 Hour	3. Nitric Acid (HNO_3), pH < 2
Malvern, AR 72104		Telephone: 501-467-8355	Routine (5 Day)	TEST PARAMETERS
Attn: Bill McAlister	Attn: Amber Rich	Fax: 501-467-8687	Preservative Code:	1
		Email: dave.friedman@eema-inc.com; bmcalister@eema-inc.com; bhorton@eema-inc.com	Bottle Type:	P

Sampler(s) Signature: Bill McAlister

Sampler(s) Printed: Bill McAlister

Field Number	SAMPLE COLLECTION Date/s	Time/s	Grab	Comp	Number of Bottles	Sample Matrix	SAMPLE IDENTIFICATION/ DESCRIPTION	Chronic Biomonitoring
FD-2 Comp.	6/17/2011	8:50 AM		X	3	W	Facility Discharge	X

1. Relinquished by: (Signature)	Date/Time	2. Received by: (Signature)	SAMPLE CONDITION UPON RECEIPT IN LAB	REMARKS / SA
Bill McAlister	6-17-11 1418		1. CUSTODY SEALS: ✓ Yes ___No	
			2. CONTAINERS CORRECT: ___Yes ___No	
			3. COC/LABELS AGREE: ___Yes ___No	
3. Relinquished by: (Signature)	Date/Time	4. Received by lab: (Signature)	4. PRESERVATION CONFIRMED: ___Yes ___No	
	6-17-11 1418	Norma Jam	5. RECEIVED ON ICE: ___Yes ___No	
			6. TEMPERATURE ON RECEIPT: 4°C	
			FOR COMPLETION BY LAB ONLY	

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

CHAIN OF CUSTODY R

CLIENT INFORMATION		Project Description	Turnaround Time	Preservation Co
EEMA O & M Services Group	EEMA O & M Services Group	Magcobar Mine Site	24 Hour	1. Cool, 4 Degrees Centigrade
Magcobar Mine Site	P.O. Box 732	Biomonitoring Sample	48 Hour	2. Sulfuric Acid (H_2SO_4), pH < 2
P.O. Box 699	Kulpsville, PA 19443	Reporting Information	72 Hour	3. Nitric Acid (HNO_3), pH < 2
Malvern, AR 72104		Telephone: 501-467-8355	Routine (5 Day)	TEST PARAMETER
Attn: Bill McAlister	Attn: Amber Rich	Fax: 501-467-8687	Preservative Code:	1
		Email: dave.friedman@eema-inc.com; bmcalister@eema-inc.com; bhorton@eema-inc.com	Bottle Type:	P

Sampler(s) Signature: Bill McAlister

Sampler(s) Printed: Bill McAlister

Field Number	SAMPLE COLLECTION Date/s	Time/s	Grab	Comp	Number of Bottles	Sample Matrix	SAMPLE IDENTIFICATION/ DESCRIPTION	Chronic Biomonitoring
FD-1 Comp.	6/21/2011	9:20 AM		X	3	W	Facility Discharge	X

1. Relinquished by: (Signature)	Date/Time	2. Received by: (Signature)	SAMPLE CONDITION UPON RECEIPT IN LAB	REMARKS / S
Bill McAlister	6-21-11 1432		1. CUSTODY SEALS: ___Yes ___No	
			2. CONTAINERS CORRECT: ___Yes ___No	
			3. COC/LABELS AGREE: ___Yes ___No	
3. Relinquished by: (Signature)	Date/Time	4. Received by lab: (Signature)	4. PRESERVATION CONFIRMED: ___Yes ___No	
		Sydney James	5. RECEIVED ON ICE: ___Yes ___No	
			6. TEMPERATURE ON RECEIPT: 2°C	
			FOR COMPLETION BY LAB ONLY	

APPENDIX B

Effluent and Dilution Water Data

CHEMICAL DATA SHEET FOR CHRONIC TOXICITY TESTING — Fathead Minnow

Lab # / Sample ID: K11060008 — Test Start (Date/Time): 6/16/11

Client: Weston — Test End (Date/Time): 6/23/11

		Day of Test 1	2	3	4	5	6	7	notes/remarks
Control	MHS551	6/16	6/17	6/18	6/19	6/20	6/21	6/22	
D.O. (mg/L)	INITIAL	7.2	8.1	8.4	8.2	8.34	8.4	7.6	
	FINAL	8.1	8.2	6.1	7.88	8.23	8.0	8.2	
pH (s.u.)	INITIAL	7.6	7.9	7.4	7.9	7.75	8.6	7.8	
	FINAL	7.6	7.5	7.2	8.09	8.26	8.0	7.7	
temp (C)	INITIAL	23.7	21.3	22.4	22.7	22.8	22.6	23.2	
	FINAL	25.0	25.0	25.0	22.6	21.9	25.0	25.0	
ALKALINITY (mg/L)		32						1	
HARDNESS (mg/L)		44						1	
CONDUCTIVITY (umhos/cm)		172						1	
CHLORINE (mg/L)		<0.05						1	
CONC:									
D.O. (mg/L)	INITIAL	7.3	8.1	HB 7.4 8.3	8.3	8.40	8.6	7.6	
	FINAL	8.1	8.1	5.9	7.65	7.95	8.0	8.2	
pH (s.u)	INITIAL	7.1	7.8	7.4	7.7	7.30	7.8	7.7	
	FINAL	6.7	7.4	6.9	7.55	7.30 MS	7.6	7.5	Day 5 - 7.77
temp (C)	INITIAL	23.5	21.5	23.0	22.6	22.8	22.8	22.8	
	FINAL	25.0	25.0	25.0	21.3	22.1 MS	25.0	25.0	Day 5 - 21.4
CONC:									
D.O. (mg/L)	INITIAL	7.2	8.2	HB 8.3 7.4 7.3	8.3	8.35	8.7	7.6	
	FINAL	8.0	8.0	5.7	7.93	7.99	8.0	8.2	
pH (mg/L)	INITIAL	7.0	7.8	7.3	7.6	7.43	7.7	7.7	
	FINAL	6.7	7.4	6.9	7.50	7.71	7.5	7.3	
temp (C)	INITIAL	23.4	21.6	23.2	22.7	23.0	22.8	22.8	
	FINAL	25.0	25.0	25.0	22.4	22.2	25.0	25.0	
CONC:									
D.O. (mg/L)	INITIAL	7.2	8.3	HB 7.3 8.4	8.3	8.34	8.7	7.7	
	FINAL	7.9	8.0	5.7	7.97	8.04	8.1	8.1	
pH (s.u.)	INITIAL	6.8	7.7	7.3	7.6	7.38	7.8	7.7	
	FINAL	6.9	7.4	6.9	7.49	7.66	7.5	7.3	
temp (C)	INITIAL	23.8	21.7	23.5	22.8	23.1	22.7	22.7	
	FINAL	25.0	25.0	25.0	21.6	22.3	25.0	25.0	
CONC:									
D.O. (mg/L)	INITIAL	7.6	8.3	HB 7.2 9.8	8.3	8.38	8.8	7.9	
	FINAL	7.8	7.9	5.7	7.89	7.90	8.0	8.0	
pH (s.u.)	INITIAL	6.7	7.5	7.2	7.5	7.37	7.7	7.6	
	FINAL	6.9	7.3	6.9	7.41	7.59	7.5	7.3	
temp (C)	INITIAL	24.7	21.7	23.8	22.9	23.0	22.5	22.5	
	FINAL	25.0	25.0	25.0	21.7	22.3	25.0	25.0	
CONC:									
D.O. (mg/L)	INITIAL	7.7	8.5	HB 7.1 8.7	8.3	8.40	8.3	8.6	
	FINAL	7.8	7.9	5.5	7.91	8.02	7.9	7.9	
pH (s.u.)	INITIAL	6.7	7.5	7.1	7.3	7.32	7.6	7.6	
	FINAL	7.0	7.2	6.8	7.32	7.43	7.5	7.2	
temp (C)	INITIAL	25.3	21.9	24.2	23.1	23.3	22.4	22.5	
	FINAL	25.0	25.0	25.0	22.4	22.5	25.0	25.0	
CONC:	**100%**	A	A	A	B	B	C	C	
ALKALINITY (mg/L)		8			6		4		
HARDNESS (mg/L)		>600			>600		>600		
CONDUCTIVITY (umhos/cm)		1935			1915		1916		
CHLORINE (mg/L)		<0.05			<0.05		<0.05		

CHEMICAL DATA SHEET FOR CHRONIC TOXICITY TESTING — Cerodaphnia Dubia

Lab # / Sample ID: KH06008 — Test Start (Date/Time): 6/16/11

Client: Weston — Test End (Date/Time): 6/23/11

		Day of Test 1	2	3	4	5	6	7	notes/remarks
Control	MHS551	6/16	6/17	6/18	6/19	6/20	6/21	6/22	
D.O. (mg/L)	INITIAL	7.2	8.1	8.4	8.2	8.34	8.42	7.6	
	FINAL	8.3	8.5	8.1	8.2	8.1	8.0	7.8	
pH (s.u.)	INITIAL	7.6	7.9	7.4	7.9	7.75	8.35	7.8	
	FINAL	7.7	7.9	8.0	8.0	8.0	7.9	7.7	
temp (C)	INITIAL	23.7	21.3	22.4	22.7	22.8	22.6	23.2	
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
ALKALINITY (mg/L)		32	—	—	—	—	—	—	
HARDNESS (mg/L)		44	—	—	—	—	—	—	
CONDUCTIVITY (umhos/cm)		172	—	—	—	—	—	—	
CHLORINE (mg/L)		<0.05	—	—	—	—	—	—	
CONC:									
D.O. (mg/L)	INITIAL	7.3	8.1	8.3	8.3	8.40	8.55	7.6	
	FINAL	8.3	8.5	8.0	8.3	8.1	8.1	7.8	
pH (s.u)	INITIAL	7.1	7.8	7.4	7.7	7.30	7.79	7.7	
	FINAL	7.1	7.7	7.7	7.8	7.5	7.5	7.4	
temp (C)	INITIAL	23.5	21.5	23.0	22.6	22.8	22.8	22.8	
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
CONC:									
D.O. (mg/L)	INITIAL	7.2	8.2	8.3	8.3	8.35	8.67	7.6	
	FINAL	8.3	8.5	8.2	8.3	8.2	8.1	7.7	
pH (mg/L)	INITIAL	7.0	7.8	7.3	7.6	7.43	7.74	7.7	
	FINAL	7.2	7.7	7.7	7.8	7.6	7.5	7.4	
temp (C)	INITIAL	23.4	21.6	23.2	22.7	23.0	22.8	22.8	
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
CONC:									
D.O. (mg/L)	INITIAL	7.2	8.3	8.4	8.3	8.34	8.69	7.7	
	FINAL	8.3	8.5	8.3	8.2	8.2	8.1	7.8	
pH (s.u.)	INITIAL	6.8	7.7	7.3	7.6	7.38	7.75	7.7	
	FINAL	7.2	7.7	7.7	7.8	7.5	7.5	7.3	
temp (C)	INITIAL	23.8	21.7	23.5	22.8	23.1	22.7	22.7	
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
CONC:									
D.O. (mg/L)	INITIAL	7.6	8.3	8.5	8.3	8.38	8.80	7.9	
	FINAL	8.2	8.5	8.3	8.1	8.3	8.1	7.7	
pH (s.u.)	INITIAL	6.7	7.5	7.2	7.5	7.57	7.65	7.6	
	FINAL	7.2	7.5	7.6	7.7	7.5	7.3	7.4	
temp (C)	INITIAL	24.7	21.7	23.8	22.9	23.0	22.5	22.5	
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
CONC:									
D.O. (mg/L)	INITIAL	7.7	8.5	8.7	8.3	8.40	9.31	8.0	
	FINAL	8.2	8.6 8.5	8.4	8.1	8.3	8.0	7.7	
pH (s.u.)	INITIAL	6.7	7.5	7.1	7.3	7.52	7.60	7.6	
	FINAL	7.1	7.4	7.5	7.6	7.5	7.2	7.2	
temp (C)	INITIAL	25.3	21.9	24.2	23.1	23.3	22.6	22.5	
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
CONC:	**100%**	A	A	A	B	B	C	C	
ALKALINITY (mg/L)		8	—	—	6	—	4	—	
HARDNESS (mg/L)		>600	—	—	>600	—	>600	—	
CONDUCTIVITY (umhos/cm)		1935	—	—	1915	—	1916	—	
CHLORINE (mg/L)		<0.05	—	—	<0.05	—	<0.05	—	

APPENDIX C

Fathead minnow raw data and statistics

SURVIVAL DATA FOR FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

LAB # / SAMPLE ID 41106008 TEST START DATE 6/16/11 TIME 1530

CLIENT Weston Summary Page TEST END DATE 6/23/11 TIME 0950

AGE AND SOURCE OF MINNOWS

			D A Y (NUMBER SURVIVING)							SURVIVAL		
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 0	A	8	8	7	7	6	6	6	6	75	90	15.2
	B			8	8	8	8	8	8	100		
	C			8	8	8	8	8	8	100		
	D			7	6	6	6	6	6	75		
	E			8	8	8	8	8	8	100		
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 32	A	8	8	8	8	8	8	8	8	100	97.5	
	B			7	7	7	7	7	7	87.5		
	C			8	8	8	8	8	8	100		
	D			8	8	8	8	8	8	100		
	E			8	8	8	8	8	8	100		
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 42	A	8	8	8	8	8	8	8	8	100	90	
	B			8	7	7	7	7	7	87.5		
	C			8	8	8	8	8	8	100		
	D			6	6	6	6	6	6	75		
	E			8	8	7	7	7	7	87.5		
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 56	A	8	8	8	7	7	7	7	7	87.5	95	
	B			8	8	8	8	8	8	100		
	C			8	8	8	8	8	8	100		
	D			8	8	8	8	8	8	100		
	E			7	7	7	7	7	7	87.5		
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 75	A	8	8	8	7	7	7	7	7	87.5	97.5	5.73
	B			8	8	8	8	8	8	100		
	C			8	8	8	8	8	8	100		
	D			8	8	8	8	8	8	100		
	E			8	8	8	8	8	8	100		
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 100	A	8	8	7	7	7	7	7	7	87.5	95	7.2
	B			8	7	7	7	7	7	87.5		
	C			8	8	8	8	8	8	100		
	D			8	8	8	8	8	8	100		
	E			8	8	8	8	8	8	100		
ANALYST												
DATE:												
TIME:												

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

SURVIVAL DATA FOR FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

LAB # / SAMPLE ID K11060008 TEST START DATE 6/16/11 TIME 1530

CLIENT Weston TEST END DATE 6/23/11 TIME 0950

AGE AND SOURCE OF MINNOWS A-

D A Y (NUMBER SURVIVING)

	REP #	start	1	2	3	4	5	6	7	SURVIVAL %	MEAN %	CV
CONC: 0	A	2	2	1	1	1	1	1	1			
	B			2	2	2	2	2	2			
	C			2	2	2	2	2	2			
	D			1	1	1	1	1	1			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 3.2	A	2	2	2	2	2	2	2	2			
	B					2	2	2	2			
	C					2	2	2	2			
	D					2	2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 4.9	A	2	2	2	2	2	2	2	2			
	B					2	2	2	2			
	C					2	2	2	2			
	D					2	2	2	1			
	E					2						
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 7.6	A	2	2	2	2	2	2	2	2			
	B				2	2	2	2	2			
	C				2	2	2	2	2			
	D				1	1	1	1	1			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 15	A	2	2	2	2	2	2	2	2			
	B				1	1	1	1	1			
	C				2	2	2	2	2			
	D				2	2	2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 100	A	2	2	2	2	2	2	2	2			
	B			2	2	2	2	2	2			
	C			1	1	1	1	1	1			
	D			2	2	2	2	2	2			
	E											
ANALYST		KP	KP	KR	KR	KP	KP	KP	KP			
DATE:		6/16/11	6/17/11	6/18/11	6/19/11	6/20/11	6/21/11	6/22/11	6/23/11			
TIME:		1530	0955	1355		1310	1330	1325	0930			

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

SURVIVAL DATA FOR FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

LAB # / SAMPLE ID | TEST START DATE 6/16/11 TIME

CLIENT Weston D | TEST END DATE TIME

AGE AND SOURCE OF MINNOWS

		D A Y (NUMBER SURVIVING)								SURVIVAL		
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 0	A	2	2	2	2	2	2	2	2			
	B						2	2	2			
	C						2	2	2			
	D						2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 3.2	A	2	2	1	1	1	1	1	1			
	B			2	2	2	2	2	2			
	C			2	2	2	2	2	2			
	D			2	2	2	2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 6.4	A	2	2	2	2	2	2	2	2			
	B		1	2	1	1	1	1	1			
	C		2	2	2	2	2	2	2			
	D		2	2	2	2	2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 12.5	A	2	2	2	2	2	2	2	2			
	B					1	2	2	2			
	C						2	2	2			
	D						2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 25	A	2	2	2	2	2	2	2	2			
	B						2	2	2			
	C						2	2	2			
	D						2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 50	A	2	2	2	2	2	2	2	2			
	B				1	1	1	1	1			
	C				2	2	2	2	2			
	D				2	2	2	2	2			
	E											
ANALYST		KP	KR	K.R.								
DATE:		6/16/11	6/17	6/18/11								
TIME:				1315								

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

SURVIVAL DATA FOR FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

LAB # / SAMPLE ID | TEST START DATE 6/16/11 TIME

CLIENT Weston C | TEST END DATE TIME

AGE AND SOURCE OF MINNOWS

D A Y (NUMBER SURVIVING) SURVIVAL

	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 0	A	2	2	2	2	2	2	2	2			
	B					2	2	2	2			
	C					2	2	2	2			
	D	+	+	+	+	2	2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 32	A	2	2	2	2	2	2	2	2			
	B					2	2	2	2			
	C					2	2	2	2			
	D	+	+	+	+	2	2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 44	A	2	2	2	2	2	2	2	2			
	B					2	2	2	2			
	C					2	2	2	2			
	D	+	+	+	+	2	2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 57	A	2	2	2	2	2	2	2	2			
	B					2	2	2	2			
	C					2	2	2	2			
	D	+	+	+	+	2	2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 75	A	2	2	2	2	2	2	2	2			
	B					2	2	2	2			
	C					2	2	2	2			
	D	+	+	+	+	2	2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 100	A	2	2	2	2	2	2	2	2			
	B					2	2	2	2			
	C					2	2	2	2			
	D	+	+	+	+	2	2	2	2			
	E											
ANALYST		KP		K.R								
DATE:		6/16/11		6/18/11								
TIME:				1315								

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

SURVIVAL DATA FOR FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

LAB # / SAMPLE ID				TEST START	DATE 6/16/11	TIME							
CLIENT Weston D				TEST END	DATE	TIME							
				AGE AND SOURCE OF MINNOWS									
				D A Y (NUMBER SURVIVING)							SURVIVAL		
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 0	A	2	2	2	1	1	1	1	1			
	B			2	2	2	2	2	2			
	C			1	1	1	1	1	1			
	D			2	2	2	2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 32	A	2	2	2	2	2	2	2	2			
	B					2	2	2	2			
	C					2	2	2	2			
	D					2	2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 49	A	2	2	2	2	2	2	2	2			
	B			2	1	1	1	1	1			
	C			2	2	2	2	2	2			
	D			1	1	1	1		1			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 76	A	2	2	2	2	2	2	2	2			
	B					2	2	2	2			
	C					2	2	2	2			
	D					2	2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 75	A	2	2	2	2	2	2	2	2			
	B					2	2	2	2			
	C					2	2	2	2			
	D					2	2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 100	A	2	2	2	2	2	2	2	2			
	B			2	2	2	2	2	2			
	C			1 2	1 2	2	2	2	2			
	D			2	2	2	2	2	2			
	E											
ANALYST		KP		K.R								
DATE:		6/16/11		6/18/11								
TIME:				1315								

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

SURVIVAL DATA FOR FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

LAB # / SAMPLE ID | TEST START DATE 6/16/11 TIME

CLIENT Weston | TEST END DATE TIME

AGE AND SOURCE OF MINNOWS

		D A Y (NUMBER SURVIVING)								SURVIVAL		
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 0	A	2	2	2	2	2	2	2	2			
	B					2	2	2	2			
	C					2	2	2	2			
	D					2	2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 3.2	A	2	2	2	2	2	2	2	2			
	B					2	2	2	2			
	C					2	2	2	2			
	D					2	2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 6.4	A	2	2	2	2	1	1	1	1			
	B					2	2	2	2			
	C					2	2	2	2			
	D					2	2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 12.5	A	2	2	2	2	2	2	2	2			
	B			2	2	2	2	2	2			
	C			2	2	2	2	2	2			
	D			1	1	1	1	1	1			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 25	A	2	2	2	2	2	2	2	2			
	B					2	2	2	2			
	C					2	2	2	2			
	D					2	2	2	2			
	E											
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: 50	A	2	2	2	2	2	2	2	2			
	B					2	2	2	2			
	C					2	2	2	2			
	D					2	2	2	2			
	E											
ANALYST		KP		KLR								
DATE:		6/16/11		6/18/11								
TIME:				1315								

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

Pimephales promelas **FATHEAD MINNOW** TEST 1000.0

WEIGHT DATA FOR LARVAL SURVIVAL AND GROWTH TEST

LAB # / #s:	K1106008					TEST DATES (BEGIN / END):	6/16-23/11	
CLIENT:	EEMA					WEIGHING DATE / TIME:	6/24/11, 1415	
ANALYSTS:	KP					DRYING TEMP (DEGREES C):	60	
SAMPLE ID:	SEE COC					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	1.00117	0.99800	0.00317	8	0.396	AVG DRY	
	B	1.00077	0.99767	0.00310	8	0.387	WEIGHT (mg)	
	C	0.99925	0.99606	0.00319	8	0.399		0.386
	D	1.01823	1.01532	0.00291	8	0.364	CV	
	E	1.02351	1.02042	0.00309	8	0.386		3.58
CONC:	A	1.00118	0.99784	0.00334	8	0.418	AVG DRY	
	B	0.96606	0.96292	0.00314	8	0.393	WEIGHT (mg)	
32%	C	1.03255	1.02847	0.00408	8	0.510		0.430
	D	1.00069	0.99720	0.00349	8	0.436	CV	
	E	0.97559	0.97245	0.00314	8	0.392		
CONC:	A	0.98153	0.97760	0.00393	8	0.491	AVG DRY	
	B	0.96480	0.96123	0.00357	8	0.446	WEIGHT (mg)	
42%	C	0.97298	0.96935	0.00363	8	0.454		0.456
	D	0.99691	0.99323	0.00368	8	0.460	CV	
	E	0.96225	0.95882	0.00343	8	0.429		
CONC:	A	0.99609	0.99225	0.00384	8	0.480	AVG DRY	
	B	1.00937	1.00570	0.00367	8	0.459	WEIGHT (mg)	
56%	C	1.02207	1.01829	0.00378	8	0.473		0.450
	D	1.01884	1.01582	0.00302	8	0.378	CV	
	E	1.01134	1.00764	0.00370	8	0.462		
CONC:	A	0.97186	0.96867	0.00319	8	0.399	AVG DRY	
	B	0.99909	0.99500	0.00409	8	0.511	WEIGHT (mg)	
75%	C	1.00984	1.00618	0.00366	8	0.458		0.479
	D	1.00015	0.99600	0.00415	8	0.519	CV	
	E	1.00068	0.99662	0.00406	8	0.508		
CONC:	A	1.01037	1.00641	0.00396	8	0.495	AVG DRY	
	B	1.01160	1.00793	0.00367	8	0.459	WEIGHT (mg)	
100%	C	1.00742	1.00361	0.00381	8	0.476		0.523
	D	0.97166	0.96677	0.00489	8	0.611	CV	
	E	1.00974	1.00514	0.00460	8	0.575		12.7

CV = (STANDARD DEVIATION/MEAN)*100

REMARKS:

Pimephales promelas **FATHEAD MINNOW** TEST 1000.0

WEIGHT DATA FOR LARVAL SURVIVAL AND GROWTH TEST

LAB # / #s: 11106008
CLIENT: Weston
ANALYSTS: KP
SAMPLE ID:

TEST DATES (BEGIN / END): 6/16-23/11
WEIGHING DATE / TIME: 6/24/11 1415
DRYING TEMP (DEGREES C): 60
DRYING TIME (HOURS): 24

	REP#	FINAL DRY WEIGHT TIN+LARVAE (g)	INTIAL WEIGHT TIN (g)	TOTAL DRY WEIGHT OF LARVAE (g)	NUMBER OF LARVAE	DRY WEIGHT OF LARVAE (mg)	
CONTROL	A 31	1.00117	0.99800				AVG DRY WEIGHT (mg)
	B 32	1.00077	0.99767				
	C 33	0.99925	0.99606				
	D 34	1.01823	1.01532				CV
	E 35	1.02351	1.02042				
CONC: 32	A 36	1.00118	0.99784				AVG DRY WEIGHT (mg)
	B 37	0.96606	0.96292				
	C 38	1.03255	1.02847				
	D 39	1.00069	0.99720				CV
	E 40	0.97559	0.97245				
CONC: 42	A 41	0.98153	0.97760				AVG DRY WEIGHT (mg)
	B 42	0.96480	0.96123				
	C 43	0.97298	0.96935				
	D 44	0.99691	0.99323				CV
	E 45	0.96225	0.95882				
CONC: 56	A 46	0.99659	0.99225				AVG DRY WEIGHT (mg)
	B 47	1.00937	1.00570				
	C 48	1.02207	1.01829				
	D 49	1.01884	1.01582				CV
	E 50	1.01134	1.00764				
CONC: 75	A 51	0.97186	0.96867				AVG DRY WEIGHT (mg)
	B 52	0.99909	0.99500				
	C 53	1.00984	1.00618				
	D 54	1.00015	0.99600				CV
	E 55	1.00068	0.99662				
CONC: 100	A 56	1.01037	1.00641				AVG DRY WEIGHT (mg)
	B 57	1.01160	1.00793				
	C 58	1.00742	1.00361				
	D 59	0.97766	0.96677				CV
	E 60	1.00974	1.00574				

CV = (STANDARD DEVIATION/MEAN)*100

REMARKS:

AA# K1106008, FATHEAD MINNOW, CHRONIC, 6-16-11
File: Z:\TOXSTAT\MONTE\FHSURV. Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.420

W = 0.880

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# K1106008, FATHEAD MINNOW, CHRONIC, 6-16-11
File: Z:\TOXSTAT\MONTE\FHSURV. Transform: ARC SINE(SQUARE ROOT(Y))

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 3.93

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.

AA# K1106008, FATHEAD MINNOW, CHRONIC, 6-16-11
File: Z:\TOXSTAT\MONTE\FHSURV. Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.364

W = 0.883

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# K1106008, FATHEAD MINNOW, CHRONIC, 6-16-11

File: Z:\TOXSTAT\MONTE\FHSURV. Transform: ARC SINE(SQUARE ROOT(Y))

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 4.46

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# K1106008, FATHEAD MINNOW, CHRONIC, 6-16-11
FILE: Z:\TOXSTAT\MONTE\FHSURV.
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	0.7500	1.0472
1	CONTROL	2	1.0000	1.3931
1	CONTROL	3	1.0000	1.3931
1	CONTROL	4	0.7500	1.0472
1	CONTROL	5	1.0000	1.3931
2	32 % EFFLUENT	1	1.0000	1.3931
2	32 % EFFLUENT	2	0.8750	1.2094
2	32 % EFFLUENT	3	1.0000	1.3931
2	32 % EFFLUENT	4	1.0000	1.3931
2	32 % EFFLUENT	5	1.0000	1.3931
3	42 % EFFLUENT	1	1.0000	1.3931
3	42 % EFFLUENT	2	0.8750	1.2094
3	42 % EFFLUENT	3	1.0000	1.3931
3	42 % EFFLUENT	4	0.7500	1.0472
3	42 % EFFLUENT	5	0.8750	1.2094
4	56 % EFFLUENT	1	0.8750	1.2094
4	56 % EFFLUENT	2	1.0000	1.3931
4	56 % EFFLUENT	3	1.0000	1.3931
4	56 % EFFLUENT	4	1.0000	1.3931
4	56 % EFFLUENT	5	0.8750	1.2094
5	75 % EFFLUENT	1	0.8750	1.2094
5	75 % EFFLUENT	2	1.0000	1.3931
5	75 % EFFLUENT	3	1.0000	1.3931
5	75 % EFFLUENT	4	1.0000	1.3931
5	75 % EFFLUENT	5	1.0000	1.3931
6	100 % EFFLUENT	1	0.8750	1.2094
6	100 % EFFLUENT	2	0.8750	1.2094
6	100 % EFFLUENT	3	1.0000	1.3931
6	100 % EFFLUENT	4	1.0000	1.3931
6	100 % EFFLUENT	5	1.0000	1.3931

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	1.255				
2	32 % EFFLUENT	1.356	31.00	16.00	5.00	
3	42 % EFFLUENT	1.250	27.00	16.00	5.00	
4	56 % EFFLUENT	1.320	29.50	16.00	5.00	
5	75 % EFFLUENT	1.356	31.00	16.00	5.00	
6	100 % EFFLUENT	1.320	29.50	16.00	5.00	

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

AA# K1106008, FATHEAD MINNOW GROWTH CHRONIC, 6-16-11
File: Z:\TOXSTAT\MONTE\FHGR. Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.048

W = 0.981

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# K1106008, FATHEAD MINNOW GROWTH CHRONIC, 6-16-11
File: Z:\TOXSTAT\MONTE\FHGR. Transform: ARC SINE(SQUARE ROOT(Y))

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 9.08

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# K1106008, FATHEAD MINNOW GROWTH CHRONIC, 6-16-11
FILE: Z:\TOXSTAT\MONTE\FHGR.
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	0.3960	0.6806
1	CONTROL	2	0.3870	0.6714
1	CONTROL	3	0.3990	0.6837
1	CONTROL	4	0.3640	0.6477
1	CONTROL	5	0.3860	0.6704
2	32 % EFFLUENT	1	0.4180	0.7030
2	32 % EFFLUENT	2	0.3930	0.6776
2	32 % EFFLUENT	3	0.5100	0.7954
2	32 % EFFLUENT	4	0.4360	0.7212
2	32 % EFFLUENT	5	0.3920	0.6765
3	42 % EFFLUENT	1	0.4910	0.7764
3	42 % EFFLUENT	2	0.4460	0.7313
3	42 % EFFLUENT	3	0.4540	0.7393
3	42 % EFFLUENT	4	0.4600	0.7454
3	42 % EFFLUENT	5	0.4290	0.7142
4	56 % EFFLUENT	1	0.4800	0.7654

4	56 % EFFLUENT	2	0.4590	0.7444
4	56 % EFFLUENT	3	0.4730	0.7584
4	56 % EFFLUENT	4	0.3780	0.6622
4	56 % EFFLUENT	5	0.4620	0.7474
5	75 % EFFLUENT	1	0.3990	0.6837
5	75 % EFFLUENT	2	0.5110	0.7964
5	75 % EFFLUENT	3	0.4580	0.7433
5	75 % EFFLUENT	4	0.5190	0.8044
5	75 % EFFLUENT	5	0.5080	0.7934
6	100 % EFFLUENT	1	0.4950	0.7804
6	100 % EFFLUENT	2	0.4590	0.7444
6	100 % EFFLUENT	3	0.4760	0.7614
6	100 % EFFLUENT	4	0.6110	0.8973
6	100 % EFFLUENT	5	0.5750	0.8607

AA# K1106008, FATHEAD MINNOW GROWTH CHRONIC, 6-16-11
File: Z:\TOXSTAT\MONTE\FHGR. Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.054	0.011	5.434
Within (Error)	24	0.048	0.002	
Total	29	0.101		

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

AA# K1106008, FATHEAD MINNOW GROWTH CHRONIC, 6-16-11
File: Z:\TOXSTAT\MONTE\FHGR. Transform: ARC SINE(SQUARE ROOT(Y))

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	0.671	0.386		
2	32 % EFFLUENT	0.715	0.430	-1.562	
3	42 % EFFLUENT	0.741	0.456	-2.505	
4	56 % EFFLUENT	0.736	0.450	-2.300	
5	75 % EFFLUENT	0.764	0.479	-3.320	
6	100 % EFFLUENT	0.809	0.523	-4.903	

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

AA# K1106008, FATHEAD MINNOW GROWTH CHRONIC, 6-16-11
File: Z:\TOXSTAT\MONTE\FHGR. Transform: ARC SINE(SQUARE ROOT(Y))

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	32 % EFFLUENT	5	0.064	16.4	-0.043
3	42 % EFFLUENT	5	0.064	16.4	-0.070
4	56 % EFFLUENT	5	0.064	16.4	-0.064
5	75 % EFFLUENT	5	0.064	16.4	-0.093
6	100 % EFFLUENT	5	0.064	16.4	-0.137

AA# K1106008, FATHEAD MINNOW GROWTH CHRONIC, 6-16-11
File: Z:\TOXSTAT\MONTE\FHGR. 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	0.671				
2	32 % EFFLUENT	0.715	36.00	16.00	5.00	
3	42 % EFFLUENT	0.741	40.00	16.00	5.00	
4	56 % EFFLUENT	0.736	36.00	16.00	5.00	
5	75 % EFFLUENT	0.764	39.50	16.00	5.00	
6	100 % EFFLUENT	0.809	40.00	16.00	5.00	

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

APPENDIX D

Ceriodaphnia dubia Raw Data and Statistics

Ceriodaphnia dubia — **SURVIVAL AND REPRODUCTION TEST**

Discharger: Weston — Lab Number/s: 1106009 — Analyst: KP

Location: — Test Start - Date/ Time: 6/16/11, 1620

Date Sample Collected: — Test Stop - Date/Time: 6/23/11, 0805

Conc 1 (%: 0)

Day	A	B	C	D	E	F	G	H	I	J	No. of Young	No. of Adult	Young/ Adult	Analyst
1	0	0	0	0	0	0	0	0	0	0	0	10	0	KP
2	0	0	0	0	0	0	0	0	0	0	0	10	0	KP
3	0	0	0	0	0	0	2	0	0	0	2	10	0.2	KP
4	4	3	4	3	4	5	3	5	3	2	36	10	3.6	KP
5	0	7	5	7	3	3	4	2	6	7	43	10	4.3	KP
6	7	1	0	2	0	0	0	0	3	1	14	9	1.6	KP
7	9	3	8	6	10	9	8	—	8	9	70	9	7.8	KP
8														
Total	20	14	17	18	16	17	17	X7	20	19	165		X= CV=	17.6 11.1

Conc 2 (%: 32)

Day	A	B	C	D	E	F	G	H	I	J	No. of Young	No. of Adult	Young/ Adult	Analyst
1	0	0	0	0	0	0	0	0	0	0	0	10	0	
2	0	0	0	0	0	0	0	0	0	0	0	10	0	
3	3	0	0	0	0	0	0	0	0	0	3	10	0.3	
4	0	7	4	6	7	4	3	5	2	7	45	10	4.5	
5	5	8	4	6	5	5	7	6	7	0	5	52	10	5.2
6	4	1	1	2	0	1	0	0	7	2	18	10	1.8	
7	7	7	8	0	9	10	1	5	2	6	55	10	5.5	
8														
Total	17	21	18	14	23	22	16	17	11	20	173			

Conc 3 (%: 42)

Day	A	B	C	D	E	F	G	H	I	J	No. of Young	No. of Adult	Young/ Adult	Analyst
1	0	0	0	0	0	0	0	0	0	0	0	10	0	
2	0	0	0	0	0	0	0	0	0	0	0	10	0	
3	1	0	0	1	0	0	0	0	0	0	2	10	0.2	
4	5	4	5	5	3	4	4	4	2	3	39	10	3.9	
5	3	9	7	4	6	5	7	6	3	7	57	10	5.7	
6	3	0	0	2	2	1	4	3	7	1	23	10	2.8	
7	5	7	6	7	0	1	7	7	4	8	52	10	5.2	
8														
Total	17	20	18	19	11	11	27	20	16	19	178			

X= DEAD; Y= MALE

Conc 4 (%: 56)

Day	A	B	C	D	E	F	G	H	I
1	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0
3	0	0	0	0	1	0	0	0	0
4	3	2	5	2	3	3	2	4	5
5	0	7	7	8	9	6	5	0	3
6	7	1	0	0	0	0	1	0	0
7	6	4	9	9	2	2	9	8	3
8									
Total	16	14	21	19	15	11	17	12	11

Conc 5 (%: 75)

Day	A	B	C	D	E	F	G	H	I
1	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0
4	4	2	5	3	4	3	6	5	1
5	9	4	6	8	5	8	9	9	6
6	6	3	1	0	1	5	10	6	5
7	9	7	7	6	3	5	1	2	9
8									
Total	28	16	19	17	13	21	24	22	15

Conc 6 (%: 100)

Day	A	B	C	D	E	F	G	H	I
1	0	0	0	0	0	0	0	0	0
2	0	0	0	0	0	0	0	0	0
3	0	0	0	0	0	0	0	0	0
4	3	4	5	4	6	5	3	4	5
5	6	3	3	3	4	6	4	5	3
6	4	3	3	3	5	4	6	3	3
7	2	4	3	4	3	4	4	3	6
8									
Total	15	18	17	14	18	19	17	15	17

Revision 1
11/30/10

AA # K1106008, C. DUBIA CHRONIC, REPRODUCION, 6-16-11
File: Z:\TOXSTAT\MONTE\CD. 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

AA # K1106008, C. DUBIA CHRONIC, REPRODUCION, 6-16-11
File: Z:\TOXSTAT\MONTE\CD. Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 4.17

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 DEAD	NUMBER OF ALIVE	TOTAL ANIMALS
CONTROL	1	9	10
32%	0	10	10
TOTAL	1	19	20

CRITICAL FISHER'S VALUE (10,10,1) (p=0.05) IS LESS THAN 0. b VALUE IS 0.
NO SIGNIFICANT DIFFERENCE

FISHER'S EXACT TEST

IDENTIFICATION	NUMBER OF DEAD	NUMBER OF ALIVE	TOTAL ANIMALS
CONTROL	1	9	10
42%	0	10	10
TOTAL	1	19	20

CRITICAL FISHER'S VALUE (10,10,1) (p=0.05) IS LESS THAN 0. b VALUE IS 0.
NO SIGNIFICANT DIFFERENCE

FISHER'S EXACT TEST

IDENTIFICATION	NUMBER OF DEAD	NUMBER OF ALIVE	TOTAL ANIMALS
CONTROL	1	9	10
56%	0	10	10
TOTAL	1	19	20

CRITICAL FISHER'S VALUE (10,10,1) (p=0.05) IS LESS THAN 0. b VALUE IS 0.
NO SIGNIFICANT DIFFERENCE

FISHER'S EXACT TEST

IDENTIFICATION	NUMBER OF DEAD	NUMBER OF ALIVE	TOTAL ANIMALS
CONTROL	1	9	10
75%	0	10	10
TOTAL	1	19	20

CRITICAL FISHER'S VALUE (10,10,1) (p=0.05) IS LESS THAN 0. b VALUE IS 0.
NO SIGNIFICANT DIFFERENCE

FISHER'S EXACT TEST

IDENTIFICATION	NUMBER OF DEAD	NUMBER OF ALIVE	TOTAL ANIMALS
CONTROL	1	9	10
100%	0	10	10
TOTAL	1	19	20

CRITICAL FISHER'S VALUE (10,10,1) (p=0.05) IS LESS THAN 0. b VALUE IS 0.
NO SIGNIFICANT DIFFERENCE

SUMMARY OF FISHER'S EXACT TESTS

GROUP	IDENTIFICATION	NUMBER EXPOSED	NUMBER DEAD	SIG (P=.05)
	CONTROL	10	1	
1	32%	10	0	
2	42%	10	0	

3	56%	10	0
4	75%	10	0
5	100%	10	0

TITLE: AA # K1106008, C. DUBIA CHRONIC, REPRODUCION, 6-16-11
FILE: Z:\TOXSTAT\MONTE\CD.
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	20.0000	20.0000
1	CONTROL	2	14.0000	14.0000
1	CONTROL	3	17.0000	17.0000
1	CONTROL	4	18.0000	18.0000
1	CONTROL	5	16.0000	16.0000
1	CONTROL	6	17.0000	17.0000
1	CONTROL	7	17.0000	17.0000
1	CONTROL	8	7.0000	7.0000
1	CONTROL	9	20.0000	20.0000
1	CONTROL	10	19.0000	19.0000
2	32 % EFFLUENT	1	17.0000	17.0000
2	32 % EFFLUENT	2	21.0000	21.0000
2	32 % EFFLUENT	3	18.0000	18.0000
2	32 % EFFLUENT	4	14.0000	14.0000
2	32 % EFFLUENT	5	23.0000	23.0000
2	32 % EFFLUENT	6	22.0000	22.0000
2	32 % EFFLUENT	7	10.0000	10.0000
2	32 % EFFLUENT	8	17.0000	17.0000
2	32 % EFFLUENT	9	11.0000	11.0000
2	32 % EFFLUENT	10	20.0000	20.0000
3	42 % EFFLUENT	1	17.0000	17.0000
3	42 % EFFLUENT	2	20.0000	20.0000
3	42 % EFFLUENT	3	18.0000	18.0000
3	42 % EFFLUENT	4	19.0000	19.0000
3	42 % EFFLUENT	5	11.0000	11.0000
3	42 % EFFLUENT	6	11.0000	11.0000
3	42 % EFFLUENT	7	27.0000	27.0000
3	42 % EFFLUENT	8	20.0000	20.0000
3	42 % EFFLUENT	9	16.0000	16.0000
3	42 % EFFLUENT	10	19.0000	19.0000
4	56 % EFFLUENT	1	16.0000	16.0000
4	56 % EFFLUENT	2	14.0000	14.0000
4	56 % EFFLUENT	3	21.0000	21.0000
4	56 % EFFLUENT	4	14.0000	14.0000
4	56 % EFFLUENT	5	15.0000	15.0000
4	56 % EFFLUENT	6	11.0000	11.0000
4	56 % EFFLUENT	7	17.0000	17.0000
4	56 % EFFLUENT	8	12.0000	12.0000
4	56 % EFFLUENT	9	17.0000	17.0000
4	56 % EFFLUENT	10	16.0000	16.0000
5	75 % EFFLUENT	1	28.0000	28.0000
5	75 % EFFLUENT	2	16.0000	16.0000
5	75 % EFFLUENT	3	19.0000	19.0000

5	75 % EFFLUENT	4	17.0000	17.0000
5	75 % EFFLUENT	5	13.0000	13.0000
5	75 % EFFLUENT	6	21.0000	21.0000
5	75 % EFFLUENT	7	24.0000	24.0000
5	75 % EFFLUENT	8	22.0000	22.0000
5	75 % EFFLUENT	9	15.0000	15.0000
5	75 % EFFLUENT	10	22.0000	22.0000
6	100 % EFFLUENT	1	12.0000	12.0000
6	100 % EFFLUENT	2	21.0000	21.0000
6	100 % EFFLUENT	3	21.0000	21.0000
6	100 % EFFLUENT	4	19.0000	19.0000
6	100 % EFFLUENT	5	18.0000	18.0000
6	100 % EFFLUENT	6	19.0000	19.0000
6	100 % EFFLUENT	7	20.0000	20.0000
6	100 % EFFLUENT	8	19.0000	19.0000
6	100 % EFFLUENT	9	23.0000	23.0000
6	100 % EFFLUENT	10	19.0000	19.0000

AA # K1106008, C. DUBIA CHRONIC, REPRODUCION, 6-16-11
File: Z:\TOXSTAT\MONTE\CD. Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	132.883	26.577	1.710
Within (Error)	54	839.300	15.543	
Total	59	972.183		

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

AA # K1106008, C. DUBIA CHRONIC, REPRODUCION, 6-16-11
File: Z:\TOXSTAT\MONTE\CD. 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	16.500	16.500		
2	32 % EFFLUENT	17.300	17.300	-0.454	
3	42 % EFFLUENT	17.800	17.800	-0.737	
4	56 % EFFLUENT	15.300	15.300	0.681	
5	75 % EFFLUENT	19.700	19.700	-1.815	
6	100 % EFFLUENT	19.100	19.100	-1.475	

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

AA # K1106008, C. DUBIA CHRONIC, REPRODUCION, 6-16-11

File: Z:\TOXSTAT\MONTE\CD. 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	32 % EFFLUENT	10	4.073	24.7	-0.800
3	42 % EFFLUENT	10	4.073	24.7	-1.300
4	56 % EFFLUENT	10	4.073	24.7	1.200
5	75 % EFFLUENT	10	4.073	24.7	-3.200
6	100 % EFFLUENT	10	4.073	24.7	-2.600

AA # K1106008, C. DUBIA CHRONIC, REPRODUCION, 6-16-11
File: Z:\TOXSTAT\MONTE\CD. Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	16.500				
2	32 % EFFLUENT	17.300	113.00	75.00	10.00	
3	42 % EFFLUENT	17.800	113.50	75.00	10.00	
4	56 % EFFLUENT	15.300	86.00	75.00	10.00	
5	75 % EFFLUENT	19.700	122.50	75.00	10.00	
6	100 % EFFLUENT	19.100	131.50	75.00	10.00	

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

APPENDIX E

Organism History

AQUATOX, INC.

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

TEST ORGANISM HISTORY

DATE SHIPPED 6/15/11 **CLIENT** ARKANSAS ANALYTICAL

Purchase Order #: _____

SPECIES:	**Pimephales promelas**	**Mysidopsis bahia**	**Cyprinodon variegates**
Quantity Shipped:	520		
Age:	4/24		
Brood Stock Source:	ANDERSON FARMS		
Culture Water:	(Groundwater)	**Artificial Salts**	**Artificial Salts**
Hardness (Mg/l CaCO3)	160°	**Salinity (ppt)**	
Dissolved Oxygen (Mg/1):	8.1		

Feeding: ARTEMIA

Comments: 25.1°C

Shipped Via: **Federal Express** **UPS Overnight** SHUTTLE

Packaged By: _____

Bill Hall Printers 3171

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: 6/22/09

SPECIES: *Ceriodaphnia dubia*

AGE: Variable

LIFE STAGE: Adult

HATCH DATE: Variable

BEGAN FEEDING: Immediately

FOOD: YTC, *Selenastrum* sp.

Water Chemistry Record:	Current	Range
TEMPERATURE:	25°C	20-25°C
SALINITY/CONDUCTIVITY:	--	--
TOTAL HARDNESS (as $CaCO_3$):	142 mg/l	86-124 mg/l
TOTAL ALKALINITY (as $CaCO_3$):	100 mg/l	65-130 mg/l
pH:	7.92	7.56-8.35

Comments:

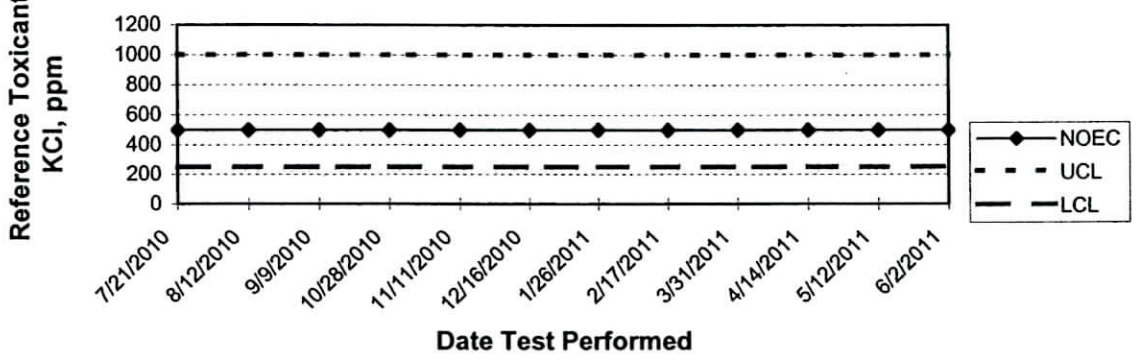
Facility Supervisor

APPENDIX F

Quality Assurance Charts

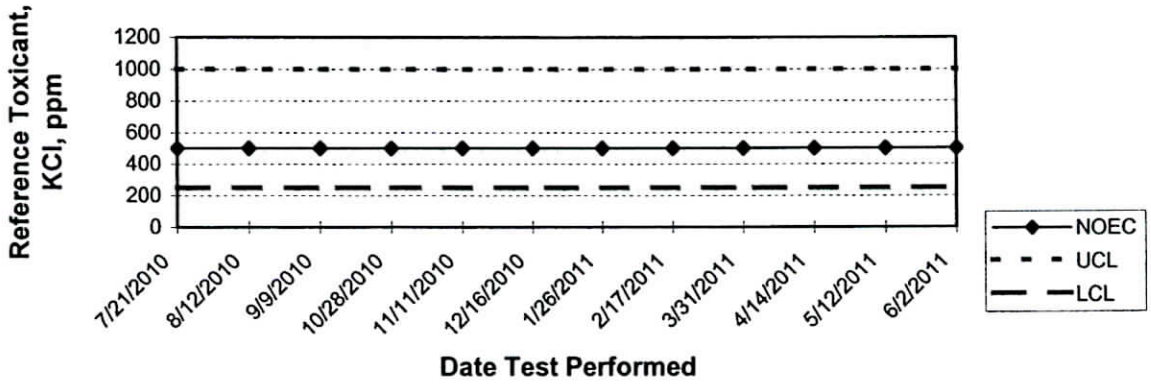
ARKANSAS ANALYTICAL, INC.

FATHEAD MINNOW SURVIVAL
QUALITY ASSURANCE



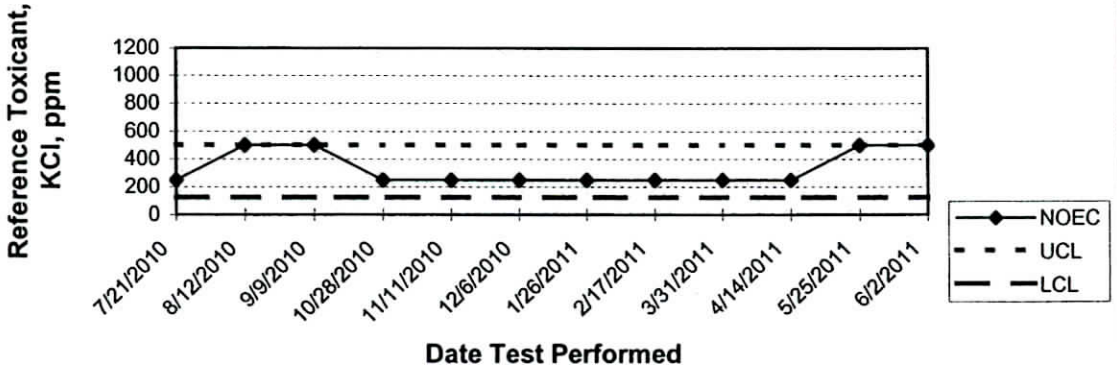
ARKANSAS ANALYTICAL, INC.

FATHEAD MINNOW GROWTH
QUALITY ASSURANCE



ARKANSAS ANALYTICAL, INC.

CERIODAPHNIA DUBIA SURVIVAL
QUALITY ASSURANCE



ARKANSAS ANALYTICAL, INC.

CERIODAPHNIA DUBIA REPRODUCTION
QUALITY ASSURANCE