



# Arkansas Analytical, Inc.

## Toxicity Test Results

**MAGCOBAR MINE SITE**  
**NPDES PERMIT NUMBER: AR0049794**  
**August 2005**

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**  
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**Lab Number K508656**

Wednesday, September 14, 2005



## **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 August of 2005.

## **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:	08-15-05, 1030	08-16-05, 0930
Sample #2:	08-16-05, 1030	08-17-05, 0930
Sample #3:	08-22-05, 1030	08-23-05, 0930

The sample was a composite 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	Storage Temperature (°C)
Sample #1:	08-16-05, 0940	4
Sample #2:	08-17-05, 1044	4
Sample #3:	08-23-05, 1126	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 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. There were no deviations from the reference method. The test chambers were 500 ml plastic cups, and each chamber contained ten organisms in a test solution volume of 250 mls. 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	100%	X	
Average of 15 or more young per surviving female	23.2	X	
At least 60% of surviving females should have produced 3 broods	90%	X	
The percent coefficient of variation between replicates must be 40% or less for the young of surviving females	19.0%	X	

#### 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	0.289	X	
The percent coefficient of variation between replicates must be 40% or less for growth	4.68%	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

<i>Ceriodaphnia dubia</i>		<i>Pimephales promelas</i>	
NOEC Survival:	250 ppm KCl	NOEC Survival:	500 ppm KCl
LOEC Survival:	500 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

<i>Ceriodaphnia dubia</i>		<i>Pimephales promelas</i>	
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)	22.6	%CV survival (critical dilution)	0.00%
%CV Reproduction (critical dilution)	17.6%	Mean dry weight (critical dilution) in milligrams	0.464
		%CV growth (critical dilution)	20.9%

### Conclusion

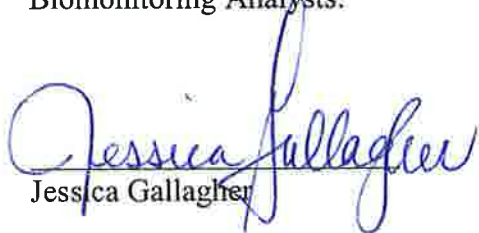
Chronic static renewal larval survival and growth test using fathead minnow, *Pimephales promelas*, (Method 1000.0).

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, 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.

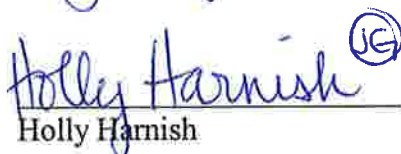
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**SUMMARY REPORTING FORMS FOR CHRONIC BIOMONITORING**  
**FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL**  
*PIMEPHALES PROMELAS*

**PERMITTEE: Magcobar Mine Site**

**NPDES #: AR0049794**

Sample Collection:	Date, Time Started	Date, Time Ended
Sample #1:	08-15-05, 1030	08-16-05, 0930
Sample #2:	08-16-05, 1030	08-17-05, 0930
Sample #3:	08-22-05, 1030	08-23-05, 0930

Test initiated (date, time): 08-18-05, 1400    Test terminated (date, time): 08-25-05, 1600

Dilution water used:    Soft 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
32%	100	100	90	100	100	100	100	98	
42%	100	100	90	100	100	100	100	98	
56%	100	100	100	90	90	100	100	96	
75%	100	100	100	100	100	100	100	100	
100%	100	100	100	100	100	100	100	100	0.00

**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%	0.296	0.275	0.295	0.304	0.274	0.289	4.68
32%	0.396	0.414	0.440	0.450	0.416	0.423	
42%	0.536	0.524	0.457	0.396	0.403	0.463	
56%	0.493	0.488	0.470	0.385	0.421	0.451	
75%	0.127	0.510	0.433	0.420	0.474	0.393	
100%	0.634	0.436	0.443	0.409	0.398	0.464	20.9

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, (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)=   0.00   %





**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:	08-15-05, 1030	08-16-05, 0930
Sample #2:	08-16-05, 1030	08-17-05, 0930
Sample #3:	08-22-05, 1030	08-23-05, 0930

Test initiated (date, time): 08-18-05, 1445    Test terminated (date, time): 08-25-05, 1100

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	22	15	14	23	19	26
B	20	22	19	26	20	22
C	27	21	27	25	28	17
D	23	25	19	26	28	19
E	20	16	20	19	26	28
F	29	23	23	21	17	23
G	21	17	23	18	26	27
H	22	23	21	19	19	17
I	31	21	17	17	19	22
J	17	24	23	28	21	25
Mean	23.2	20.7	20.6	22.2	22.3	22.6
Mean/surviving female	23.2	20.7	20.6	22.2	22.3	22.6
CV%*	19.0					17.6

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: 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	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, (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)=  19.0  %






APPENDIX A

Chain of Custody Forms





CHAIN OF CUSTODY RECORD

CLIENT INFORMATION				Project Description		Turnaround Time (CIRCLE ONE)		Preservation Codes:							
EEEMA O&M P.O. Box 699 2000 Darby Lane Malvern, AR 72104 Attn: Darrel Scott				MAGCOBAR Mine Site <b>Reporting Information</b> Telephone: 501/467-8355 FAX: 501/467-8687 Bill to/P.O		24 hour 48 hour <b>routine</b>		1. Cool, 4 degrees Centigrade 2. Sulfuric Acid, pH <2 3. Nitric Acid, pH <2 4. Thiosulfate for dechlorination 5. Hydrochloric Acid for VOA 6. Sodium Hydroxide, pH >12							
Samplers: (Signature/s) 				Samplers: (Printed) Darrel Scott				Bottle Type P							
								TEST PARAMETERS Bottle type code G=glass, P=HDPE V=septum, A=amber							
Field Number		Sample Collection Date/s		Time/s		Grab		Comp		# of Containers		SAMPLE IDENTIFICATION/ DESCRIPTION		Arkansas Analytical Lab #	
FD823COMP		8/23/2005		9:30		X		X		4		Facility Discharge		K508656C	
1. Relinquished by: (Signature)		Date/Time		1. Received by: (Signature)		For completion by laboratory						REMARKS			
		8-23-05 10:00				Condition of samples: A. Containers Correct? <input type="checkbox"/> YES <input type="checkbox"/> NO B. Preservation Correct? <input type="checkbox"/> YES <input type="checkbox"/> NO C. Seals Intact? <input type="checkbox"/> YES <input type="checkbox"/> NO									
2. Relinquished by: (Signature)		Date/Time		2. Received by: (Signature)											
		8-23-05 11:20													

APPENDIX B

Effluent and Dilution Water Data

CHEMICAL DATA SHEET FOR CHRONIC TOXICITY TESTING

Ceriodaphnia dubia

Lab # / Sample ID		K508656							Test Start (Date/Time)	8-18-05/1430
Client		EEMA							Test End (Date/Time)	8-25-05/11000
		Day of Test								
		1	2	3	4	5	6	7	8	notes/remarks
<b>Control</b>		8-18	8-19	8-20	8-21	8-22	8-23	8-24		SS133
D.O (mg/L)	INITIAL	8.0	7.4	7.8	7.7	7.5	7.4	7.6		
	FINAL	6.5	7.9	8.0	7.8	8.1	8.2	8.1		
pH	INITIAL	7.1	7.3	7.4	7.5	7.7	7.6	7.7		
	FINAL	7.6	7.4	7.8	7.6	7.8	7.7	7.6		
temp(C)	INITIAL	21.2	23.7	23.8	22.7	23.4	23.8	22.9		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0		
ALKALINITY(mg/L)		21								
HARDNESS(mg/L)		31								
CONDUCTIVITY(umhos/cm)		129								
CHLORINE(mg/L)		20.05								
<b>CONC:</b>		32%	32%	32%	32%	32%	32%	32%		
D.O (mg/L)	INITIAL	8.1	7.6	7.8	7.8	7.9	8.1	8.3		
	FINAL	7.4	7.8	7.9	8.0	8.2	8.1	8.1		
pH	INITIAL	7.1	7.0	7.3	7.2	7.1	7.3	8.0		
	FINAL	7.2	7.3	7.5	8.1	7.7	7.8	7.7		
temp(C)	INITIAL	21.1	23.8	23.8	23.7	23.4	23.8	22.9		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0		
<b>CONC:</b>		42%	42%	42%	42%	42%	42%	42%		
D.O (mg/L)	INITIAL	8.1	8.1	7.8	8.1	8.3	8.5	8.4		
	FINAL	7.4	7.5	7.6	7.7	8.1	8.0	8.2		
pH	INITIAL	7.1	7.0	7.4	7.2	7.1	7.3	8.3		
	FINAL	7.3	7.3	7.4	7.8	7.3	7.4	7.5		
temp(C)	INITIAL	21.0	23.8	23.8	24.6	23.4	23.8	22.9		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0		
<b>CONC:</b>		56%	56%	56%	56%	56%	56%	56%		
D.O (mg/L)	INITIAL	8.0	7.7	7.9	8.2	8.0	8.2	8.0		
	FINAL	7.3	7.6	7.7	7.9	7.7	7.9	8.2		
pH	INITIAL	7.1	6.9	7.3	7.2	7.5	7.7	7.9		
	FINAL	7.2	7.3	7.3	7.5	7.4	7.5	7.5		
temp(C)	INITIAL	21.0	23.7	24.0	25.5	23.4	23.8	22.9		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0		
<b>CONC:</b>		75%	75%	75%	75%	75%	75%	75%		
D.O (mg/L)	INITIAL	8.1	7.9	7.9	8.3	8.0	8.2	8.0		
	FINAL	7.1	7.5	7.6	7.8	7.5	7.6	8.3		
pH	INITIAL	7.0	6.8	7.3	7.2	7.4	7.6	7.8		
	FINAL	7.2	7.2	7.2	7.4	7.7	7.8	7.5		
temp(C)	INITIAL	20.9	23.8	24.1	26.2	23.4	23.8	23.0		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0		
<b>CONC:</b>		100%	100%	100%	100%	100%	100%	100%		
D.O (mg/L)	INITIAL	8.2	7.8	8.0	8.8	8.2	8.0	7.8		
	FINAL	7.1	7.5	7.6	7.8	7.9	8.0	8.0		
pH	INITIAL	6.9	7.1	7.1	7.2	7.0	7.2	7.4		
	FINAL	7.1	7.1	7.1	7.4	7.3	7.4	7.4		
temp(C)	INITIAL	20.9	23.8	24.1	26.9	23.4	23.8	22.9		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0		
<b>CONC:</b>		100%	B	A	B	C	C	C		
ALKALINITY(mg/L)		19	12	19	—	24	—	—		
HARDNESS(mg/L)		1398	1355	1398	—	1431	—	—		
CONDUCTIVITY(umhos/cm)		2350	2360	2350	—	2310	—	—		
CHLORINE(mg/L)		20.05	20.05	20.05	—	20.05	—	—		



CHEMICAL DATA SHEET FOR CHRONIC TOXICITY TESTING

Fathead Minnow

Lab # / Sample ID		K508656							Test Start (Date/Time)	8-18-05/1300
Client		EEMA							Test End (Date/Time)	8-25-05/1600
		Day of Test								
		1	2	3	4	5	6	7	notes/remarks	
<b>Control</b>		8-18	8-19	8-20	8-21	8-22	8-23	8-24	SS HB <sup>2</sup> 133	
D.O (mg/L)	INITIAL	8.0	7.4	7.8	7.7	7.5	7.4	7.6		
	FINAL	6.5	7.6	7.6	7.8	7.6	7.5	7.6		
pH(mg/L)	INITIAL	7.1	7.3	7.4	7.5	7.7	7.6	7.7		
	FINAL	7.7	7.3	7.6	7.8	7.9	8.1	7.1		
temp(C)	INITIAL	21.2	23.7	23.8	22.7	23.4	23.8	22.9		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0		
ALKALINITY(mg/L)		21							1	
HARDNESS(mg/L)		31							1	
CONDUCTIVITY(umhos/cm)		129							1	
CHLORINE(mg/L)		<0.05							1	
<b>CONC:</b>		32%	32%	32%	32%	32%	32%	32%		
D.O (mg/L)	INITIAL	8.1	7.6	7.8	7.8	7.9	8.1	8.3		
	FINAL	8.5	7.6	7.6	7.5	7.7	8.1	7.7		
pH(mg/L)	INITIAL	7.1	7.0	7.3	7.2	7.1	7.3	8.0		
	FINAL	6.8	7.2	7.2	7.1	7.5	7.2	8.0		
temp(C)	INITIAL	21.1	23.8	23.8	23.7	23.4	23.8	22.9		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0		
<b>CONC:</b>		42%	42%	42%	42%	42%	42%	42%		
D.O (mg/L)	INITIAL	8.1	8.1	7.8	8.1	8.3	8.5	8.4		
	FINAL	7.3	7.5	7.1	7.3	7.2	7.9	7.3		
pH(mg/L)	INITIAL	7.1	7.0	7.4	7.2	7.1	7.3	8.3		
	FINAL	7.4	7.2	7.2	7.5	7.4	7.8	6.9		
temp(C)	INITIAL	21.0	23.8	23.8	24.6	23.4	23.8	22.9		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0		
<b>CONC:</b>		56%	56%	56%	56%	56%	56%	56%		
D.O (mg/L)	INITIAL	8.0	7.7	7.9	8.2	8.0	8.2	8.0		
	FINAL	7.3	7.3	7.2	7.5	7.9	8.0	7.4		
pH(mg/L)	INITIAL	7.1	7.3	7.6	7.2	7.5	7.7	7.9		
	FINAL	7.3	7.2	7.2	7.7	8.1	7.5	7.9		
temp(C)	INITIAL	21.0	23.7	24.0	25.5	23.4	23.8	22.9		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0		
<b>CONC:</b>		75%	75%	75%	75%	75%	75%	75%		
D.O (mg/L)	INITIAL	8.1	7.9	7.9	8.3	8.0	8.2	8.0		
	FINAL	7.2	7.3	7.1	7.3	7.5	6.8	7.8		
pH(mg/L)	INITIAL	7.6	6.8	7.3	7.2	7.4	7.6	7.8		
	FINAL	7.3	7.1	7.1	7.4	7.1	7.6	7.9		
temp(C)	INITIAL	20.9	23.8	24.1	26.2	23.4	23.8	23.0		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0		
<b>CONC:</b>		100%	100%	100%	100%	100%	100%	100%		
D.O (mg/L)	INITIAL	8.2	7.8	8.0	8.8	8.2	8.0	7.8		
	FINAL	7.3	7.5	7.1	7.4	7.2	7.7	6.9		
pH(mg/L)	INITIAL	6.9	7.1	7.1	7.2	7.0	7.2	7.4		
	FINAL	7.2	7.0	7.0	7.5	6.9	8.0	7.0		
temp(C)	INITIAL	20.9	23.8	24.1	26.9	23.4	23.8	22.9		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0		
<b>CONC:</b>		100%	B	A	B	B	C	C		
ALKALINITY (mg/L)		19	12	19	—	24	—	—		
HARDNESS(mg/L)		1398	1355	1398	—	1431	—	—		
CONDUCTIVITY(umhos/cm)		2350	2360	2350	—	2340	—	—		
CHLORINE(mg/L)		<0.05	<0.05	<0.05	—	<0.05	—	—		

APPENDIX C

Fathead minnow raw data and statistics



WEIGHT DATA FOR LARVAL SURVIVAL AND GROWTH TEST

LAB #/ #s: K508650				TEST DATES (BEGIN / END): 8-18-05-08-25-05		
CLIENT: EEMA				WEIGHING DATE / TIME: 08-19-05, 1330		
ANALYSTS: JM, HH				DRYING TEMP (DEGREES C): 60		
SAMPLE ID:				DRYING TIME (HOURS): 24 hours		
	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 61	1.26343	1.26047			AVG DRY WEIGHT (mg)
	B 62	1.25957	1.25682			
	C 63	1.25005	1.24710			CV
	D 64	1.25152	1.24848			
	E 65	1.25775	1.25501			
32%	A 66	1.26598	1.26202			AVG DRY WEIGHT (mg)
	B 67	1.25825	1.25411			
	C 68	1.26221	1.25781			CV
	D 69	1.25166	1.24716			
	E 70	1.25728	1.25312			
42%	A 71	1.26309	1.25973			AVG DRY WEIGHT (mg)
	B 72	1.26912	1.26388			
	C 73	1.26038	1.25581			CV
	D 74	1.25109	1.24713			
	E 75	1.26779	1.26376			
56%	A 76	1.26385	1.25892			AVG DRY WEIGHT (mg)
	B 77	1.25751	1.25263			
	C 78	1.24928	1.24458			CV
	D 79	1.25788	1.25403			
	E 80	1.25506	1.24585			
75%	A 81	1.26172	1.26045			AVG DRY WEIGHT (mg)
	B 82	1.24900	1.24390			
	C 83	1.25112	1.24679			CV
	D 84	1.24885	1.24465			
	E 85	1.25009	1.24535			
100%	A 86	1.24987	1.24353			AVG DRY WEIGHT (mg)
	B 87	1.25149	1.24713			
	C 88	1.25083	1.24640			CV
	D 89	1.25476	1.25069			
	E 90	1.26163	1.25765			

CV = (STANDARD DEVIATION/MEAN)\*100

REMARKS:

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

LAB # / #s:		K508656			TEST DATES (BEGIN / END):		08/18-25/05	
CLIENT:		Weston			WEIGHING DATE / TIME:		08-26-05, 1330	
ANALYSTS:		jm, hh			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)		
<b>CONTROL</b>	A	1.26343	1.26047	0.00296	10	0.296	<b>AVG DRY</b>	
	B	1.25957	1.25682	0.00275	10	0.275	<b>WEIGHT (mg)</b>	
	C	1.25005	1.24710	0.00295	10	0.295	0.289	
	D	1.25152	1.24848	0.00304	10	0.304	<b>CV</b>	
	E	1.25775	1.25501	0.00274	10	0.274	4.68	
<b>CONC:</b>	A	1.26598	1.26202	0.00396	10	0.396	<b>AVG DRY</b>	
	B	1.25825	1.25411	0.00414	10	0.414	<b>WEIGHT (mg)</b>	
	C	1.26221	1.25781	0.00440	10	0.440	0.423	
	D	1.25166	1.24716	0.00450	10	0.450	<b>CV</b>	
	E	1.25728	1.25312	0.00416	10	0.416		
<b>CONC:</b>	A	1.26509	1.25973	0.00536	10	0.536	<b>AVG DRY</b>	
	B	1.26912	1.26388	0.00524	10	0.524	<b>WEIGHT (mg)</b>	
	C	1.26038	1.25581	0.00457	10	0.457	0.463	
	D	1.25109	1.24713	0.00396	10	0.396	<b>CV</b>	
	E	1.26779	1.26376	0.00403	10	0.403		
<b>CONC:</b>	A	1.26385	1.25892	0.00493	10	0.493	<b>AVG DRY</b>	
	B	1.25751	1.25263	0.00488	10	0.488	<b>WEIGHT (mg)</b>	
	C	1.24928	1.24458	0.00470	10	0.470	0.451	
	D	1.25788	1.25403	0.00385	10	0.385	<b>CV</b>	
	E	1.25006	1.24585	0.00421	10	0.421		
<b>CONC:</b>	A	1.26172	1.26045	0.00127	10	0.127	<b>AVG DRY</b>	
	B	1.24900	1.24390	0.00510	10	0.510	<b>WEIGHT (mg)</b>	
	C	1.25112	1.24679	0.00433	10	0.433	0.393	
	D	1.24885	1.24465	0.00420	10	0.420	<b>CV</b>	
	E	1.25009	1.24535	0.00474	10	0.474		
<b>CONC:</b>	A	1.24987	1.24353	0.00634	10	0.634	<b>AVG DRY</b>	
	B	1.25149	1.24713	0.00436	10	0.436	<b>WEIGHT (mg)</b>	
	C	1.25083	1.24640	0.00443	10	0.443	0.464	
	D	1.25478	1.25069	0.00409	10	0.409	<b>CV</b>	
	E	1.26163	1.25765	0.00398	10	0.398	20.9	

CV = (STANDARD DEVIATION/MEAN)\*100

**REMARKS:**

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AA# K508656, FATHEAD MINNOW SURVIVAL, 08-18-05  
File: k508656s Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

---

D = 0.074

L = 0.760

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.

DATA# K508656, FATHEAD MINNOW SURVIVAL, 08-18-05  
File: k508656s Transform: ARC SINE(SQUARE ROOT(Y))

Hartley's test for homogeneity of variance  
Bartlett's test for homogeneity of variance

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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.

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TITLE: AA# K508656, FATHEAD MINNOW SURVIVAL, 08-18-05

FILE: k508656s

TRANSFORM: ARC SINE(SQUARE ROOT(Y))

NUMBER OF GROUPS: 6

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GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	1.0000	1.4120
1	CONTROL	2	1.0000	1.4120
1	CONTROL	3	1.0000	1.4120
1	CONTROL	4	1.0000	1.4120
1	CONTROL	5	1.0000	1.4120
2	32 % EFFLUENT	1	1.0000	1.4120
2	32 % EFFLUENT	2	1.0000	1.4120
2	32 % EFFLUENT	3	0.9000	1.2490
2	32 % EFFLUENT	4	1.0000	1.4120
2	32 % EFFLUENT	5	1.0000	1.4120
3	42 % EFFLUENT	1	1.0000	1.4120
3	42 % EFFLUENT	2	1.0000	1.4120
3	42 % EFFLUENT	3	0.9000	1.2490
3	42 % EFFLUENT	4	1.0000	1.4120
3	42 % EFFLUENT	5	1.0000	1.4120
4	56 % EFFLUENT	1	1.0000	1.4120
4	56 % EFFLUENT	2	1.0000	1.4120
4	56 % EFFLUENT	3	1.0000	1.4120
4	56 % EFFLUENT	4	0.9000	1.2490
4	56 % EFFLUENT	5	0.9000	1.2490
5	75 % EFFLUENT	1	1.0000	1.4120
5	75 % EFFLUENT	2	1.0000	1.4120
5	75 % EFFLUENT	3	1.0000	1.4120
5	75 % EFFLUENT	4	1.0000	1.4120
5	75 % EFFLUENT	5	1.0000	1.4120
6	100 % EFFLUENT	1	1.0000	1.4120
6	100 % EFFLUENT	2	1.0000	1.4120
6	100 % EFFLUENT	3	1.0000	1.4120
6	100 % EFFLUENT	4	1.0000	1.4120
6	100 % EFFLUENT	5	1.0000	1.4120

---



AA# K508656, FATHEAD MINNOW SURVIVAL, 08-18-05

File: k508656s 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	1.412				
2	32 % EFFLUENT	1.379	25.00	16.00	5.00	
3	42 % EFFLUENT	1.379	25.00	16.00	5.00	
4	56 % EFFLUENT	1.347	22.50	16.00	5.00	
5	75 % EFFLUENT	1.412	27.50	16.00	5.00	
6	100 % EFFLUENT	1.412	27.50	16.00	5.00	

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

AA # K508656, FATHEAD MINNOW GROWTH, 08-18-05  
File: k508656g Transform: NO TRANSFORMATION

Shapiro - Wilk's test for normality

---

D = 0.159

$\lambda$  = 0.894

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 # K508656, FATHEAD MINNOW GROWTH, 08-18-05  
File: k508656g Transform: NO TRANSFORMATION

---

Bartlett's test for homogeneity of variance  
Calculated B1 statistic = 22.46

---

Table Chi-square value = 15.09 (alpha = 0.01, df = 5)  
Table Chi-square value = 11.07 (alpha = 0.05, df = 5)

Data FAIL B1 homogeneity test at 0.01 level. Try another transformation.

TITLE: AA # K508656, FATHEAD MINNOW GROWTH, 08-18-05  
FILE: k508656g  
TRANSFORM: NO TRANSFORMATION

NUMBER OF GROUPS: 6

---

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	0.2960	0.2960
1	CONTROL	2	0.2750	0.2750
1	CONTROL	3	0.2950	0.2950
1	CONTROL	4	0.3040	0.3040
1	CONTROL	5	0.2740	0.2740
2	32 % EFFLUENT	1	0.3960	0.3960
2	32 % EFFLUENT	2	0.4140	0.4140
2	32 % EFFLUENT	3	0.4400	0.4400
2	32 % EFFLUENT	4	0.4510	0.4510
2	32 % EFFLUENT	5	0.4160	0.4160
3	42 % EFFLUENT	1	0.5360	0.5360
3	42 % EFFLUENT	2	0.5240	0.5240
3	42 % EFFLUENT	3	0.4570	0.4570
3	42 % EFFLUENT	4	0.3960	0.3960
3	42 % EFFLUENT	5	0.4030	0.4030
4	56 % EFFLUENT	1	0.4930	0.4930
4	56 % EFFLUENT	2	0.4880	0.4880
4	56 % EFFLUENT	3	0.4700	0.4700
4	56 % EFFLUENT	4	0.3850	0.3850
4	56 % EFFLUENT	5	0.4210	0.4210
5	75 % EFFLUENT	1	0.1270	0.1270
5	75 % EFFLUENT	2	0.5100	0.5100
5	75 % EFFLUENT	3	0.4330	0.4330
5	75 % EFFLUENT	4	0.4200	0.4200
5	75 % EFFLUENT	5	0.4740	0.4740
6	100 % EFFLUENT	1	0.6340	0.6340
6	100 % EFFLUENT	2	0.4360	0.4360
6	100 % EFFLUENT	3	0.4430	0.4430
6	100 % EFFLUENT	4	0.4090	0.4090
6	100 % EFFLUENT	5	0.3980	0.3980

---

AA # K508656, FATHEAD MINNOW GROWTH, 08-18-05  
File: k508656g Transform: NO TRANSFORMATION

STEEL'S MANY-ONE RANK TEST

Ho: Control < Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	0.289				
2	32 % EFFLUENT	0.423	40.00	16.00	5.00	
3	42 % EFFLUENT	0.463	40.00	16.00	5.00	
4	56 % EFFLUENT	0.451	40.00	16.00	5.00	
5	75 % EFFLUENT	0.393	35.00	16.00	5.00	
6	100 % EFFLUENT	0.464	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

**SURVIVAL AND REPRODUCTION TEST**

*Ceriodaphnia dubia*

Analyst: HH, TLT, tb  
 Test Start-Date/Time: 8-18-05 / 1445  
 Test Stop-Date/Time: 8-25-05 / 1100

Discharger: EEMA (Weston)  
 Location: K508656  
 Date Sample Collected: SEE COC

Conc 4	Day	Replicate											No. of Young Adults	Young/Adult	Analyst	
		A	B	C	D	E	F	G	H	I	J					
%	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	TLT
	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	tb
	3	0	0	3	4	0	5	0	0	0	5	17	10	1.7	TLT	
	4	4	5	4	6	3	4	5	6	3	5	45	10	4.5	HH	
	5	6	9	5	7	8	5	7	6	5	8	66	10	6.6	HH	
	6	13	12	13	9	8	7	6	7	9	10	94	10	9.4	HH	
	7															
	8															
Total		23	20	25	26	19	21	18	19	17	28	222				

Conc 5	Day	Replicate											No. of Young Adults	Young/Adult	Analyst	
		A	B	C	D	E	F	G	H	I	J					
%	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	TLT
	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	tb
	3	0	0	4	0	0	0	4	0	0	0	8	10	0.8	TLT	
	4	2	2	5	6	4	2	5	3	5	4	38	10	3.8	HH	
	5	7	7	9	8	10	6	8	6	5	9	75	10	7.5	HH	
	6	10	11	10	14	12	9	9	10	9	8	102	10	10.2	HH	
	7															
	8															
Total		19	20	28	28	26	17	26	19	19	21	223				

Conc 6	Day	Replicate											No. of Young Adults	Young/Adult	Analyst	
		A	B	C	D	E	F	G	H	I	J					
%	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	TLT
	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	tb
	3	0	0	0	0	5	0	4	0	0	4	13	10	1.3	TLT	
	4	5	6	4	2	7	6	7	3	5	4	49	10	4.9	HH	
	5	9	7	5	7	6	8	8	6	7	5	68	10	6.8	HH	
	6	12	9	8	10	10	9	8	8	10	12	96	10	9.6	HH	
	7															
	8															
Total		20	22	17	19	28	23	27	17	22	25	226	22.6	CN=17.4		

Conc 1	Day	Replicate											No. of Young Adults	Young/Adult	Analyst	
		A	B	C	D	E	F	G	H	I	J					
%	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	TLT
	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	tb
	3	0	0	0	2	0	0	4	0	0	2	8	10	0.8	TLT	
	4	4	3	6	6	5	6	7	5	7	3	50	10	5.0	HH	
	5	7	8	9	7	8	5	7	8	5	7	71	10	7.1	HH	
	6	11	9	12	10	8	13	9	10	14	7	103	10	10.3	HH	
	7															
	8															
Total		22	20	27	23	26	21	22	31	17	23	232	23.2	CN=19.0		

Conc 2	Day	Replicate											No. of Young Adults	Young/Adult	Analyst	
		A	B	C	D	E	F	G	H	I	J					
%	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	TLT
	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	tb
	3	0	0	0	0	4	0	4	0	0	0	8	10	0.8	TLT	
	4	2	5	6	4	2	1	2	3	9	6	34	10	3.4	HH	
	5	6	8	7	9	6	8	4	4	6	7	70	10	7.0	HH	
	6	7	9	8	12	8	10	7	11	10	13	95	10	9.5	HH	
	7															
	8															
Total		15	22	21	25	16	23	17	23	21	24	207				

Conc 3	Day	Replicate											No. of Young Adults	Young/Adult	Analyst	
		A	B	C	D	E	F	G	H	I	J					
%	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	TLT
	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	tb
	3	0	0	2	0	0	0	0	0	0	4	6	10	0.6	TLT	
	4	3	5	4	2	5	6	4	2	2	5	38	10	3.8	HH	
	5	4	6	8	7	6	8	5	9	7	5	65	10	6.5	HH	
	6	7	8	13	10	9	9	14	10	8	9	97	10	9.7	HH	
	7															
	8															
Total		14	19	27	19	20	23	23	21	17	23	206				

X=DEAD; Y=MALE

AA# K508656, C DUBIA REPRODUCTION, 08-18-05  
File: k508656 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# K508656, C DUBIA REPRODUCTION, 08-18-05  
File: k508656 Transform: NO TRANSFORMATION

---

Bartlett's test for homogeneity of variance  
Calculated B1 statistic = 0.65

---

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# K508656, C DUBIA REPRODUCTION, 08-18-05  
 FILE: k508656  
 TRANSFORM: NO TRANSFORMATION

NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	22.0000	22.0000
1	CONTROL	2	20.0000	20.0000
1	CONTROL	3	27.0000	27.0000
1	CONTROL	4	23.0000	23.0000
1	CONTROL	5	20.0000	20.0000
1	CONTROL	6	29.0000	29.0000
1	CONTROL	7	21.0000	21.0000
1	CONTROL	8	22.0000	22.0000
1	CONTROL	9	31.0000	31.0000
1	CONTROL	10	17.0000	17.0000
2	32 % EFFLUENT	1	15.0000	15.0000
2	32 % EFFLUENT	2	22.0000	22.0000
2	32 % EFFLUENT	3	21.0000	21.0000
2	32 % EFFLUENT	4	25.0000	25.0000
2	32 % EFFLUENT	5	16.0000	16.0000
2	32 % EFFLUENT	6	23.0000	23.0000
2	32 % EFFLUENT	7	17.0000	17.0000
2	32 % EFFLUENT	8	23.0000	23.0000
2	32 % EFFLUENT	9	21.0000	21.0000
2	32 % EFFLUENT	10	24.0000	24.0000
3	42 % EFFLUENT	1	14.0000	14.0000
3	42 % EFFLUENT	2	19.0000	19.0000
3	42 % EFFLUENT	3	27.0000	27.0000
3	42 % EFFLUENT	4	19.0000	19.0000
3	42 % EFFLUENT	5	20.0000	20.0000
3	42 % EFFLUENT	6	23.0000	23.0000
3	42 % EFFLUENT	7	23.0000	23.0000
3	42 % EFFLUENT	8	21.0000	21.0000
3	42 % EFFLUENT	9	17.0000	17.0000
3	42 % EFFLUENT	10	23.0000	23.0000
4	56 % EFFLUENT	1	23.0000	23.0000
4	56 % EFFLUENT	2	26.0000	26.0000
4	56 % EFFLUENT	3	25.0000	25.0000
4	56 % EFFLUENT	4	26.0000	26.0000
4	56 % EFFLUENT	5	19.0000	19.0000
4	56 % EFFLUENT	6	21.0000	21.0000
4	56 % EFFLUENT	7	18.0000	18.0000
4	56 % EFFLUENT	8	19.0000	19.0000
4	56 % EFFLUENT	9	17.0000	17.0000
4	56 % EFFLUENT	10	28.0000	28.0000
5	75 % EFFLUENT	1	19.0000	19.0000
5	75 % EFFLUENT	2	20.0000	20.0000
5	75 % EFFLUENT	3	28.0000	28.0000
5	75 % EFFLUENT	4	28.0000	28.0000
5	75 % EFFLUENT	5	26.0000	26.0000
5	75 % EFFLUENT	6	17.0000	17.0000
5	75 % EFFLUENT	7	26.0000	26.0000
5	75 % EFFLUENT	8	19.0000	19.0000
5	75 % EFFLUENT	9	19.0000	19.0000

5	75	%	EFFLUENT	10	21.0000	21.0000
6	100	%	EFFLUENT	1	26.0000	26.0000
6	100	%	EFFLUENT	2	22.0000	22.0000
6	100	%	EFFLUENT	3	17.0000	17.0000
6	100	%	EFFLUENT	4	19.0000	19.0000
6	100	%	EFFLUENT	5	28.0000	28.0000
6	100	%	EFFLUENT	6	23.0000	23.0000
6	100	%	EFFLUENT	7	27.0000	27.0000
6	100	%	EFFLUENT	8	17.0000	17.0000
6	100	%	EFFLUENT	9	22.0000	22.0000
6	100	%	EFFLUENT	10	25.0000	25.0000

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AA# K508656, C DUBIA REPRODUCTION, 08-18-05  
 File: k508656 Transform: NO TRANSFORMATION

STEEL'S MANY-ONE RANK TEST

Ho: Control < Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	23.200				
2	32 % EFFLUENT	20.700	94.50	75.00	10.00	
3	42 % EFFLUENT	20.600	90.00	75.00	10.00	
4	56 % EFFLUENT	22.200	97.50	75.00	10.00	
5	75 % EFFLUENT	22.300	94.00	75.00	10.00	
6	100 % EFFLUENT	22.600	103.00	75.00	10.00	

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

FISHER'S EXACT TEST

IDENTIFICATION	NUMBER OF		
	ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
32% effluent'	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
42% effluent	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
56% effluent	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

-----  
NUMBER OF  
-----

IDENTIFICATION	ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
75% effluent	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

-----  
NUMBER OF  
-----

IDENTIFICATION	ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
100% effluent	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  
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GROUP	IDENTIFICATION	NUMBER EXPOSED	NUMBER DEAD	SIG (P=.05)
	CONTROL	10	0	
1	32% effluent	10	0	
2	42% effluent	10	0	
3	56% effluent	10	0	
4	75% effluent	10	0	
5	100% effluent	10	0	

TITLE: AA# K508656, C DUBIA REPRODUCTION, 08-18-05  
 FILE: k508656  
 TRANSFORM: NO TRANSFORMATION

NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	22.0000	22.0000
1	CONTROL	2	20.0000	20.0000
1	CONTROL	3	27.0000	27.0000
1	CONTROL	4	23.0000	23.0000
1	CONTROL	5	20.0000	20.0000
1	CONTROL	6	29.0000	29.0000
1	CONTROL	7	21.0000	21.0000
1	CONTROL	8	22.0000	22.0000
1	CONTROL	9	31.0000	31.0000
1	CONTROL	10	17.0000	17.0000
2	32 % EFFLUENT	1	15.0000	15.0000
2	32 % EFFLUENT	2	22.0000	22.0000
2	32 % EFFLUENT	3	21.0000	21.0000
2	32 % EFFLUENT	4	25.0000	25.0000
2	32 % EFFLUENT	5	16.0000	16.0000
2	32 % EFFLUENT	6	23.0000	23.0000
2	32 % EFFLUENT	7	17.0000	17.0000
2	32 % EFFLUENT	8	23.0000	23.0000
2	32 % EFFLUENT	9	21.0000	21.0000
2	32 % EFFLUENT	10	24.0000	24.0000
3	42 % EFFLUENT	1	14.0000	14.0000
3	42 % EFFLUENT	2	19.0000	19.0000
3	42 % EFFLUENT	3	27.0000	27.0000
3	42 % EFFLUENT	4	19.0000	19.0000
3	42 % EFFLUENT	5	20.0000	20.0000
3	42 % EFFLUENT	6	23.0000	23.0000
3	42 % EFFLUENT	7	23.0000	23.0000
3	42 % EFFLUENT	8	21.0000	21.0000
3	42 % EFFLUENT	9	17.0000	17.0000
3	42 % EFFLUENT	10	23.0000	23.0000
4	56 % EFFLUENT	1	23.0000	23.0000
4	56 % EFFLUENT	2	26.0000	26.0000
4	56 % EFFLUENT	3	25.0000	25.0000
4	56 % EFFLUENT	4	26.0000	26.0000
4	56 % EFFLUENT	5	19.0000	19.0000
4	56 % EFFLUENT	6	21.0000	21.0000
4	56 % EFFLUENT	7	18.0000	18.0000
4	56 % EFFLUENT	8	19.0000	19.0000
4	56 % EFFLUENT	9	17.0000	17.0000
4	56 % EFFLUENT	10	28.0000	28.0000
5	75 % EFFLUENT	1	19.0000	19.0000
5	75 % EFFLUENT	2	20.0000	20.0000
5	75 % EFFLUENT	3	28.0000	28.0000
5	75 % EFFLUENT	4	28.0000	28.0000
5	75 % EFFLUENT	5	26.0000	26.0000
5	75 % EFFLUENT	6	17.0000	17.0000
5	75 % EFFLUENT	7	26.0000	26.0000
5	75 % EFFLUENT	8	19.0000	19.0000
5	75 % EFFLUENT	9	19.0000	19.0000



5	75	%	EFFLUENT	10	21.0000	21.0000
6	100	%	EFFLUENT	1	26.0000	26.0000
6	100	%	EFFLUENT	2	22.0000	22.0000
6	100	%	EFFLUENT	3	17.0000	17.0000
6	100	%	EFFLUENT	4	19.0000	19.0000
6	100	%	EFFLUENT	5	28.0000	28.0000
6	100	%	EFFLUENT	6	23.0000	23.0000
6	100	%	EFFLUENT	7	27.0000	27.0000
6	100	%	EFFLUENT	8	17.0000	17.0000
6	100	%	EFFLUENT	9	22.0000	22.0000
6	100	%	EFFLUENT	10	25.0000	25.0000

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APPENDIX E

Organism History

**AQUATOX, INC.**

100 Springwood Drive #15  
Hot Springs, Arkansas 71913  
(501) 767-9120

**TEST ORGANISM HISTORY**

DATE SHIPPED 8-18-05 Arkansas Analytical

SPECIES *Pimphales promelas*

QUANTITY SHIPPED 1100<sup>+</sup>

AGE/LIFE STAGE 24 hrs 8/18 15000+

BROODSTOCK SOURCE Anderson Farms, AR

CULTURE WATER groundwater

ALKALINITY (Mg/l as CaCO<sub>3</sub>) = 180

**HARDNESS** (Mg/l as CaCO<sub>3</sub>)/Salinity (ppt) = 160

FEEDING ATF Milk

COMMENTS \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

PACKAGED BY uu



# Aquatic Research Organisms

## DATA SHEET

### I. Organism History

Species: Ceriodaphnia dubia

Source: Lab reared  Hatchery reared  Field collected

Hatch date 01/05 Receipt date \_\_\_\_\_

Lot number 02 07 05 CD Strain ARO

Brood Origination EPA OH

### II. Water Quality

Temperature 24 °C Salinity — ppt DO SAT

pH 7.4 Hardness ~75 ppm

### III. Culture Conditions

System: Fed static renewal

Diet: Flake Food  Phytoplankton  Trout Chow

Brine Shrimp  Rotifers  Other YCT

Prophylactic Treatments: \_\_\_\_\_

Comments: All gravid as of 2:00pm  
EOT

### IV. Shipping Information

Client: Arkansas Analytical # of Organisms: 1 culture

Carrier: Fed Ex Date Shipped: 2/7/05

Biologist: [Signature]

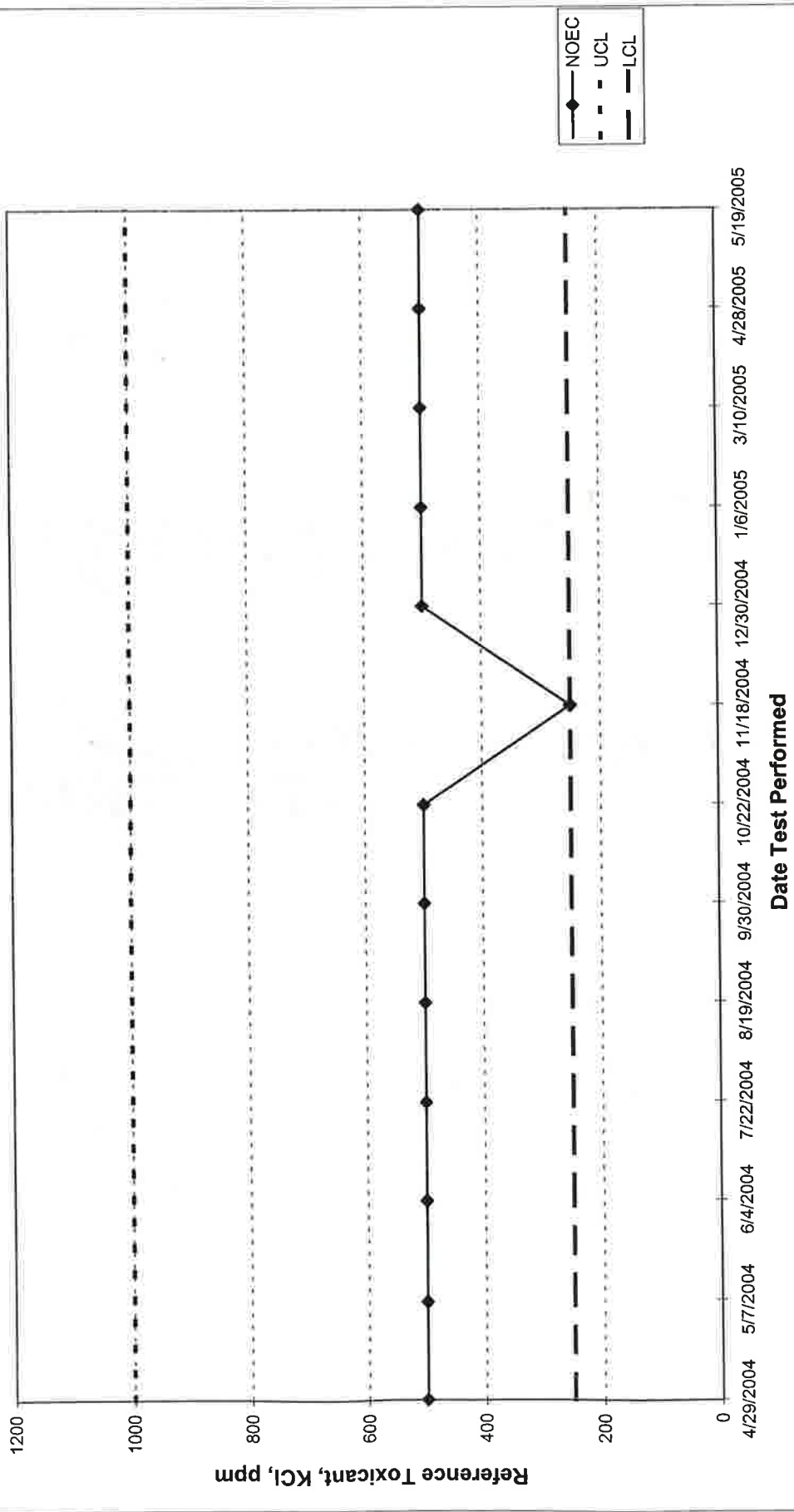
1 - 800 - 927 - 1650

PO Box 1271 • One Lafayette Road • Hampton, NH 03842 • (603) 926-1650

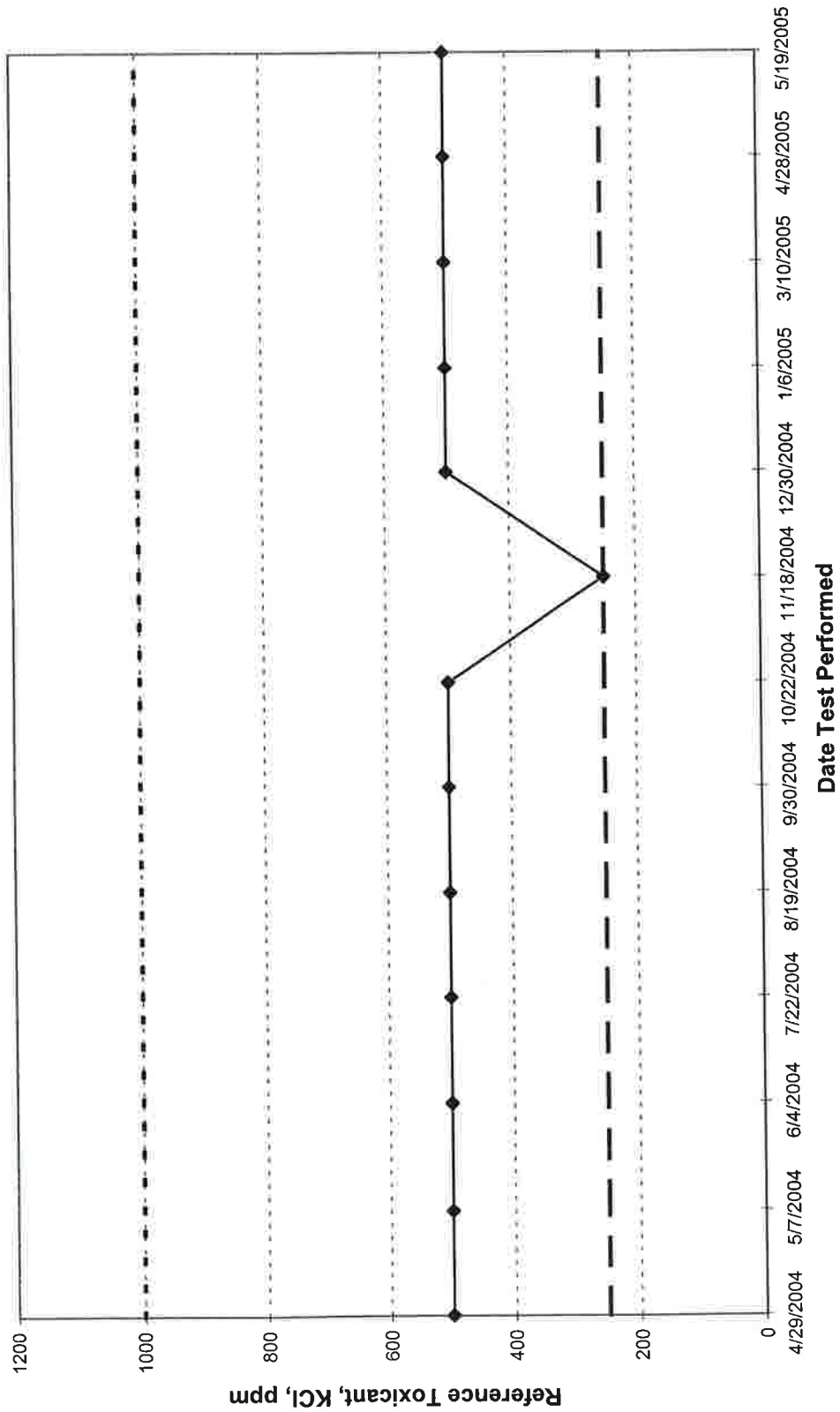
APPENDIX F

Quality Assurance Charts

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

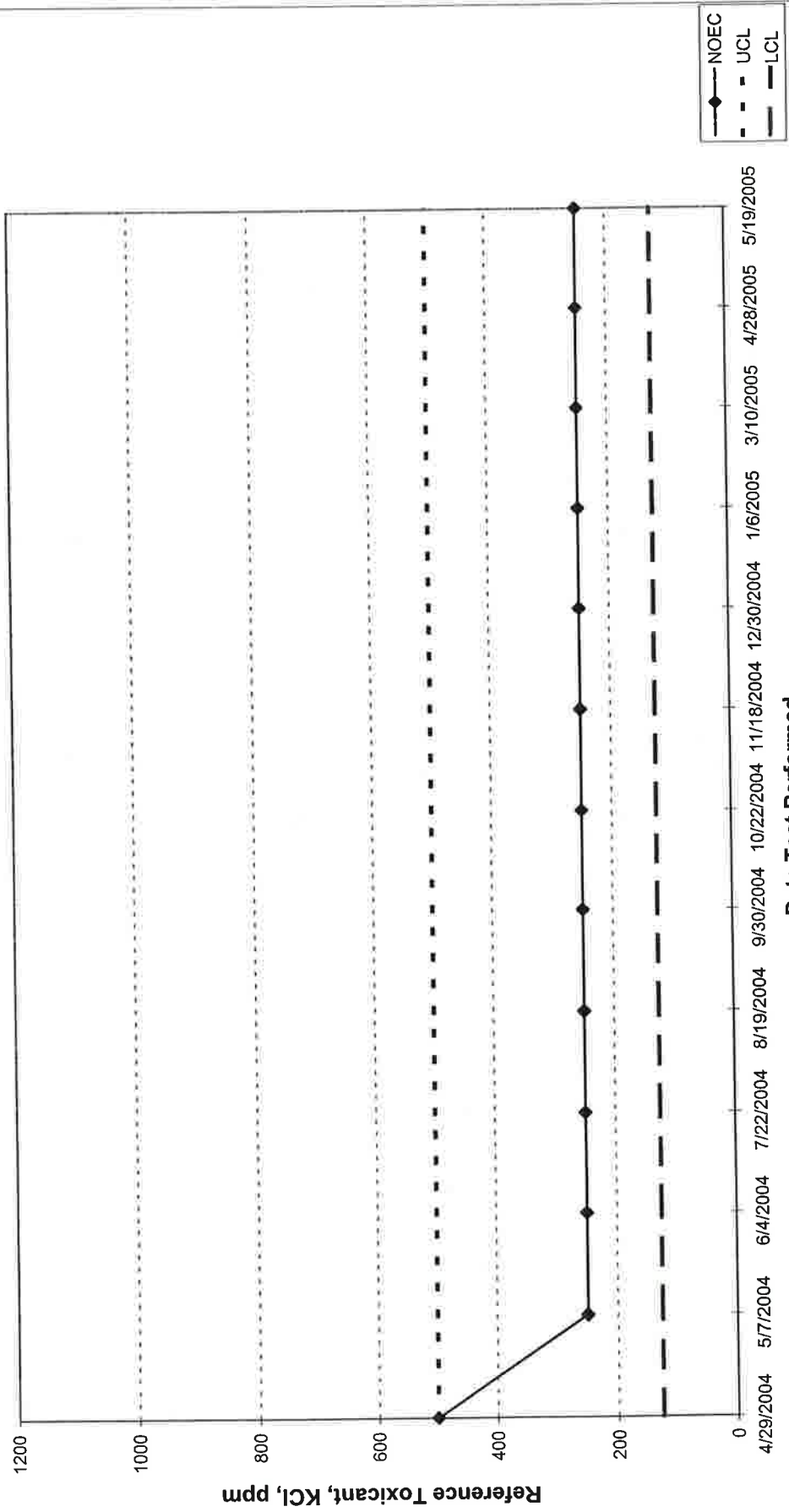


**ARKANSAS ANALYTICAL, INC.**  
**FATHEAD MINNOW GROWTH**  
**QUALITY ASSURANCE**



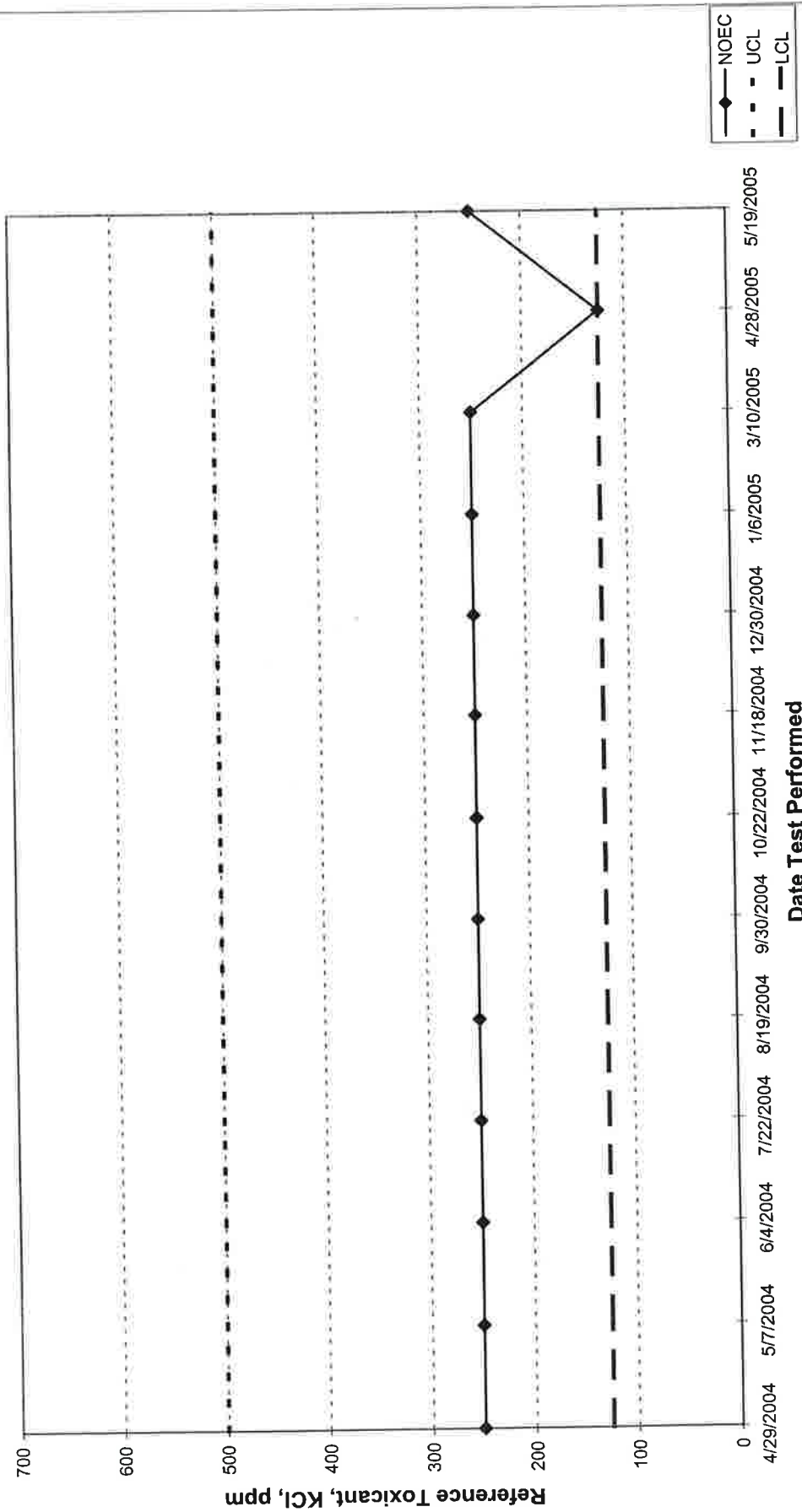
—◆— NOEC  
- - - UCL  
- - - LCL

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





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



APPENDIX G

Lab Certification



State of Arkansas  
 Department of Environmental Quality  
 Laboratory Certification Program  
**Arkansas Analytical, Inc.**  
 Little Rock, AR

*has earned certification by law in accordance with Code Annotated §8-2-201 et seq., the State Environmental Laboratory Certification Program Act for the following parameters:*

Alkalinity	Orthophosphate	Antimony	Mercury	Tin
Ammonia	Perchlorate	Arsenic	Molybdenum	Titanium
BOD	pH	Barium	Nickel	TPHC
Bromide	Phenol	Beryllium	Potassium	Vanadium
CBOD	Sulfate	Boron	Selenium	Volatile Organics
Chloride	Sulfide	Cadmium	Silver	Zinc
Chlorine	Surfactants	Calcium	Sodium	
COD	TDS	Chromium	Strontium	
Conductivity	TKN	Cobalt	Acute Toxicity	
Cyanide	TOC	Copper	Chronic Toxicity	
Fluoride	Total Phosphorus	Hex. Chromium	Fecal Coliform	
Hardness	Total Solids	Iron	Herbicides	
Nitrate	TSS	Lead	Pesticides & PCBs	
Nitrite	Turbidity	Magnesium	Semi-volatiles	
Oil & Grease	Aluminum	Manganese	Thallium	

Laboratory ID: 60-1754

Certificate Number: 04-075-0

Issued Date: 30 October 2004

Expired Date: 30 October 2005

*JA Semlowski*  
 ADEQ Quality Assurance Officer  
 Date *October 27, 2004*