



Arkansas Analytical, Inc.

Toxicity Test Results

MAGCOBAR MINE SITE
NPDES PERMIT NUMBER: AR0049794
October 2004

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**
Weston Solutions
Magcobar Mine Site
2000 Darby Lane
Malvern, AR 72104

Prepared by: Arkansas Analytical, Inc.
11701 I-30, Bldg 1, Suite 115
Little Rock, Arkansas 72209
Lab Number K410771

Monday, November 22, 2004

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 Quachita 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 October of 2004.

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:	10-27-04	10-28-04
Sample #2:	10-31-04, 1000	11-1-04, 1000
Sample #3:	11-2-04, 1000	11-3-04, 1000

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:	10-28-04, 1537	4
Sample #2:	11-1-04, 1508	4
Sample #3:	11-3-04, 1440	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 < 48 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	25.2	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	12.1%	X	

TEST ACCEPTANCE CRITERIA for *Pimephales promelas*

Control Criteria	Results	Pass	Fail
Greater than or equal to 80% survival	98%	X	
The percent coefficient of variation between replicates must be 40% or less for survival	4.56%	X	
Minimum of 0.25 mg average dry weight of surviving controls	0.407	X	
The percent coefficient of variation between replicates must be 40% or less for growth	6.35%	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)	23.9	%CV survival (critical dilution)	9.32%
%CV Reproduction (critical dilution)	15.3%	Mean dry weight (critical dilution) in milligrams	0.549
		%CV growth (critical dilution)	6.95%

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.

Biomonitoring Analysts:


Melissa Green


Andrea Fox


Joel Ledbetter

**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:	10-27-04	10-28-04
Sample #2:	10-31-04, 1000	11-1-04, 1000
Sample #3:	11-2-04, 1000	11-3-04, 1000

Test initiated (date, time): 10-29-04, 1700 Test terminated (date, time): 11-5-04, 1040

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	90	100	98	98	4.56
32%	90	100	90	100	100	100	98	96	
42%	100	100	100	100	100	100	100	100	
56%	100	100	100	90	90	100	98	96	
75%	70	100	100	100	100	98	98	94	
100%	100	100	100	100	80	98	96	96	9.32

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%	0.435	0.405	0.431	0.380	0.383	0.407	6.35
32%	0.364	0.548	0.394	0.530	0.281	0.423	
42%	0.499	0.568	0.651	0.457	0.543	0.544	
56%	0.563	0.536	0.533	0.574	0.562	0.554	
75%	0.489	0.591	0.569	0.636	0.331	0.523	
100%	0.571	0.548	0.545	0.490	0.592	0.549	6.95

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)= 9.32 %

**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:	10-27-04	10-28-04
Sample #2:	10-31-04, 1000	11-1-04, 1000
Sample #3:	11-2-04, 1000	11-3-04, 1000

Test initiated (date, time): 10-29-04, 1450 Test terminated (date, time): 11-4-04, 0740

Dilution water used: Soft Synthetic

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

Replicate	0%	32%	42%	52%	75%	100%
A	24	27	25	31	24	22
B	19	25	25	31	29	20
C	27	23	24	26	26	18
D	27	26	28	30	23	26
E	24	28	22	26	27	27
F	22	25	26	21	25	21
G	29	23	28	28	28	27
H	27	29	24	32	33	26
I	25	30	24	24	29	X0
J	28	29	27	28	28	28
Mean	25.2	26.5	25.3	27.7	27.2	21.5
Mean/surviving female	25.2	26.5	25.3	27.7	27.2	23.9
CV%*	12.1					15.3

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	90

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





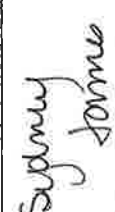
c) Coefficient of variation (parameter TQP3B)= 15.3 %



APPENDIX A

Chain of Custody Forms

CHAIN OF CUSTODY RECORD

CLIENT INFORMATION			Project Description			Turnaround Time			Preservation Codes:		
Weston Solutions, Inc.			MAGCOBAR Mine Site			(CIRCLE ONE)			1. Cool, 4 degrees Centigrade		
P.O. Box 699			Reporting Information			24 hour			2. Sulfuric Acid, pH <2		
2000 Darby Lane			Telephone: 501/467-8355			48 hour			3. Nitric Acid, pH <2		
Malvern, AR 72104			FAX: 501/467-8687			<input checked="" type="radio"/> routine Preservative Code:			4. Thioussate for dechlorination		
Attn: Alan Brown			Bill to P.O.			<input type="radio"/> P Bottle Type			5. Hydrochloric Acid for VOA		
			Darrel Scott			Chronic Bio			TEST PARAMETERS		
									Bottle type code G=glass, P=HDPE V=septum, A=amber		
Samplers: (Signature/s)			Samplers: (Printed)			SAMPLE IDENTIFICATION/ DESCRIPTION			Arkansas Analytical Lab #		
Field Number	Sample Collection Date/s	Time/s	Grab	Comp	# of Containers	Sample Matrix	Facility Discharge			Lab #	
FD1103COMP	11/3/2004	10:00	X		3					K4107710	
1. Relinquished by: (Signature)			Date/Time			1. Received by: (Signature)			For completion by laboratory		
			11-3-04 1440						Condition of samples: YES: <input checked="" type="checkbox"/> NO: <input type="checkbox"/> A. Containers Correct? <input checked="" type="checkbox"/>		
2. Relinquished by: (Signature)			Date/Time			2. Received by: (Signature)			B. Preservation Correct? <input checked="" type="checkbox"/>		
			11-3-04, 1440						C. Seals Intact? <input checked="" type="checkbox"/>		
REMARKS											



APPENDIX B

Effluent and Dilution Water Data

CHEMICAL DATA SHEET FOR CHRONIC TOXICITY TESTING

Fathead Minnow

Lab # / Sample ID		6410711		Test Start (Date/Time)		10-29-04 / 1700		notes/remarks	
Client		Worston		Test End (Date/Time)		11-5-04 / 1040			
		Day of Test							
		1	2	3	4	5	6	7	
Control		10/29	10-30	10/31	11/1	11/2	11/3	11/4	10/29 SS 114
D.O (mg/L)	INITIAL	7.6	7.6	7.7	7.7	7.0	7.4	7.0	
	FINAL	7.2	7.2	7.4	7.2	6.9	6.7	6.9	
pH(mg/L)	INITIAL	7.4	7.5	7.4	7.8	7.7	7.7	7.6	
	FINAL	7.5	7.4	7.6	7.8	7.7	7.7	7.6	
temp(C)	INITIAL	21.0	20.5	20.9	20.7	21.9	21.8	21.9	
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
ALKALINITY(mg/L)		30							
HARDNESS(mg/L)		48							
CONDUCTIVITY(umhos/cm)		175							
CHLORINE(mg/L)		0.05							
CONC:		32%	32%	32%	32%	32%	32%	32%	
D.O (mg/L)	INITIAL	7.6	7.6	7.7	7.7	7.8	7.4	7.0	
	FINAL	7.2	7.2	7.3	7.1	6.8	6.8	6.9	
pH(mg/L)	INITIAL	7.4	7.5	7.4	7.8	7.8	7.7	7.7	
	FINAL	7.6	7.6	7.5	7.7	7.6	7.7	7.6	
temp(C)	INITIAL	21.0	20.3	21.3	20.9	21.9	21.8	21.9	
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
CONC:		42%	42%	42%	42%	42%	42%	42%	
D.O (mg/L)	INITIAL	7.6	7.6	7.5	7.6	7.9	7.7	7.1	
	FINAL	7.3	7.3	7.4	7.0	6.8	6.9	6.8	
pH(mg/L)	INITIAL	7.3	7.4	7.4	7.6	7.8	7.7	7.7	
	FINAL	7.5	7.5	7.5	7.7	7.5	7.7	7.6	
temp(C)	INITIAL	21.0	20.7	21.6	20.9	21.9	21.8	21.9	
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
CONC:		54%	56%	56%	54%	54%	54%	54%	
D.O (mg/L)	INITIAL	7.7	7.6	7.4	7.6	8.0	7.9	7.1	
	FINAL	7.2	7.2	7.3	7.0	6.8	6.9	6.8	
pH(mg/L)	INITIAL	7.3	7.5	7.5	7.4	7.8	7.7	7.7	
	FINAL	7.6	7.4	7.5	7.6	7.5	7.8	7.6	
temp(C)	INITIAL	21.0	22.0	21.9	20.9	21.9	21.8	21.9	
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
CONC:		75%	75%	75%	75%	75%	75%	75%	
D.O (mg/L)	INITIAL	7.8	7.7	7.6	7.5	8.0	7.9	7.1	
	FINAL	7.1	7.0	7.3	7.0	6.8	7.0	6.9	
pH(mg/L)	INITIAL	7.2	7.5	7.4	7.7	7.7	7.8	7.7	
	FINAL	7.6	7.5	7.4	7.6	7.4	7.8	7.6	
temp(C)	INITIAL	21.0	22.3	21.4	20.9	22.1	21.8	22.1	
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
CONC:		100%	100%	100%	100%	100%	100%	100%	
D.O (mg/L)	INITIAL	7.8	7.7	7.7	7.5	8.1	8.2	7.2	
	FINAL	7.0	7.3	7.3	7.0	6.8	7.1	6.8	
pH(mg/L)	INITIAL	7.2	7.4	7.4	7.6	7.7	7.8	7.7	
	FINAL	7.4	7.4	7.3	7.5	7.4	7.9	7.5	
temp(C)	INITIAL	21.0	22.6	22.3	20.9	22.1	21.8	22.0	
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
CONC:		100%	A	A	B	A	C	C	
ALKALINITY (mg/L)		9			10		8		
HARDNESS(mg/L)		130			120		130		
CONDUCTIVITY(umhos/cm)		2350			2340		2390		
CHLORINE(mg/L)		0.05			0.05		0.05		

CHEMICAL DATA SHEET FOR CHRONIC TOXICITY TESTING

Ceriodaphnia dubia

Lab # / Sample ID		10410771						Test Start (Date/Time)		10-29-04/1450	
Client		Weston						Test End (Date/Time)		11-4-04/0740	
		Day of Test									
		1	2	3	4	5	6	7	8	notes/remarks	
Control		10/29	10/30	10/31	11/1	11/2	11/3			10/29 SS ill	
D.O (mg/L)	INITIAL	7.6	7.6	7.7	7.7	7.6	7.4				
	FINAL	7.4	7.3	7.0	7.1	7.3	7.0				
pH	INITIAL	7.4	7.5	7.4	7.8	7.7	7.7				
	FINAL	7.3	7.3	7.4	7.6	7.6	7.4				
temp(C)	INITIAL	21.0	20.5	20.9	20.7	21.9	21.8				
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0				
ALKALINITY(mg/L)		30									
HARDNESS(mg/L)		48									
CONDUCTIVITY(umhos/cm)		175									
CHLORINE(mg/L)		0.05									
CONC:		32%	32%	32%	32%	32%	32%				
D.O (mg/L)	INITIAL	7.6	7.6	7.7	7.7	7.8	7.6				
	FINAL	7.4	7.3	7.1	7.1	7.3	7.0				
pH	INITIAL	7.4	7.5	7.4	7.8	7.8	7.7				
	FINAL	7.3	7.4	7.4	7.5	7.6	7.5				
temp(C)	INITIAL	21.0	20.3	21.3	20.9	21.9	21.8				
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0				
CONC:		42%	42%	42%	42%	42%	42%				
D.O (mg/L)	INITIAL	7.6	7.6	7.5	7.6	7.9	7.7				
	FINAL	7.2	7.3	7.1	7.2	7.4	6.9				
pH	INITIAL	7.3	7.4	7.4	7.6	7.8	7.7				
	FINAL	7.2	7.4	7.4	7.5	7.6	7.5				
temp(C)	INITIAL	21.0	20.7	21.6	20.9	21.9	21.8				
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0				
CONC:		56%	56%	56%	56%	56%	56%				
D.O (mg/L)	INITIAL	7.7	7.6	7.4	7.6	8.0	7.9				
	FINAL	7.0	7.3	7.2	7.2	7.4	6.9				
pH	INITIAL	7.3	7.5	7.5	7.6	7.8	7.7				
	FINAL	7.5	7.4	7.4	7.4	7.6	7.4				
temp(C)	INITIAL	21.0	22.0	21.9	20.9	21.9	21.8				
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0				
CONC:		75%	75%	75%	75%	75%	75%				
D.O (mg/L)	INITIAL	7.8	7.7	7.6	7.5	8.0	7.9				
	FINAL	7.0	7.0	7.2	7.3	7.3	6.9				
pH	INITIAL	7.2	7.5	7.4	7.7	7.7	7.8				
	FINAL	7.4	7.3	7.5	7.4	7.6	7.4				
temp(C)	INITIAL	21.0	22.3	21.4	20.9	22.1	21.8				
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0				
CONC:		100%	100%	100%	100%	100%	100%				
D.O (mg/L)	INITIAL	7.8	7.7	7.7	7.5	8.1	8.2				
	FINAL	7.5	6.6	7.3	7.4	7.4	6.9				
pH	INITIAL	7.2	7.4	7.4	7.6	7.7	7.8				
	FINAL	7.5	7.3	7.5	7.4	7.6	7.5				
temp(C)	INITIAL	21.0	22.6	22.3	20.9	22.1	21.8				
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0				
CONC:		100%	A	A	B	B	C				
ALKALINITY(mg/L)		9			10		8				
HARDNESS(mg/L)		1310			1290		1300				
CONDUCTIVITY(umhos/cm)		235			2340		2390				
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 K410771 TEST START DATE 10-29 TIME 1700
 CLIENT Weston TEST END DATE 11-5 TIME 1040
 AGE AND SOURCE OF MINNOWS 248 hrs Aquatox

CONC:	REP #	DAY (NUMBER SURVIVING)								SURVIVAL		
		start	1	2	3	4	5	6	7	%	MEAN %	CV
Control	A	10	10	10	10	10	10	10	10	100	98%	4.56%
	B	10	10	10	10	10	10	10	10	100		
	C	10	10	10	10	10	10	10	10	100		
	D	10	10	10	10	10	10	10	10	100		
	E	10	9	9	9	9	9	9	9	90		
32%	A	10	10	9	9	9	9	9	9	90	96%	
	B	10	10	10	10	10	10	10	10	100		
	C	10	10	9	9	9	9	9	9	90		
	D	10	10	10	10	10	10	10	10	100		
	E	10	10	10	10	10	10	10	10	100		
42%	A	10	10	10	10	10	10	10	10	100	100%	
	B	10	10	10	10	10	10	10	10	100		
	C	10	10	10	10	10	10	10	10	100		
	D	10	10	10	10	10	10	10	10	100		
	E	10	10	10	10	10	10	10	10	100		
56%	A	10	10	10	10	10	10	10	10	100	96%	
	B	10	10	10	10	10	10	10	10	100		
	C	10	10	10	10	10	10	10	10	100		
	D	10	9	9	9	9	9	9	9	90		
	E	10	10	9	9	9	9	9	9	90		
75%	A	10	9	9	9	9	7	7	7	70	94%	
	B	10	10	10	10	10	10	10	10	100		
	C	10	10	10	10	10	10	10	10	100		
	D	10	10	10	10	10	10	10	10	100		
	E	10	10	10	10	10	10	10	10	100		
100%	A	10	10	10	10	10	10	10	10	100	96%	9.32%
	B	10	10	10	10	10	10	10	10	100		
	C	10	10	10	10	10	10	10	10	100		
	D	10	10	10	10	10	10	10	10	100		
	E	10	9	8	8	8	8	8	8	80		
ANALYST:		AF/mj	JL	JL	mj	mj	AF	mj	mj			
DATE:		10-29	10/30	10/31	11-1	11-2	11-3	11-4	11-5			
TIME:		1700	1650	1318	1620	1230	1600	1515	1040			

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

WEIGHT DATA FOR LARVAL SURVIVAL AND GROWTH TEST

LAB # / #s:		K410771		TEST DATES (BEGIN / END):		10/29-11/4, 2004	
CLIENT:		Weston		WEIGHING DATE / TIME:		11/8/04, 1045	
ANALYSTS:		mg, ad		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	0.93360	0.92925	0.00435	10	0.435	AVG DRY WEIGHT (mg)
	B	0.93178	0.92773	0.00405	10	0.405	
	C	0.93551	0.93120	0.00431	10	0.431	0.407
	D	0.93323	0.92943	0.00380	10	0.380	CV
	E	0.92915	0.92532	0.00383	10	0.383	
CONC:	A	0.93221	0.92857	0.00364	10	0.364	AVG DRY WEIGHT (mg)
	B	0.93917	0.93369	0.00548	10	0.548	
	C	0.93591	0.93197	0.00394	10	0.394	0.423
	D	0.93852	0.93322	0.00530	10	0.530	CV
	E	0.93539	0.93258	0.00281	10	0.281	
CONC:	A	0.94284	0.93785	0.00499	10	0.499	AVG DRY WEIGHT (mg)
	B	0.94012	0.93444	0.00568	10	0.568	
	C	0.93924	0.93273	0.00651	10	0.651	0.544
	D	0.94028	0.93571	0.00457	10	0.457	CV
	E	0.93622	0.93079	0.00543	10	0.543	
CONC:	A	0.93907	0.93344	0.00563	10	0.563	AVG DRY WEIGHT (mg)
	B	0.94347	0.93811	0.00536	10	0.536	
	C	0.94113	0.93580	0.00533	10	0.533	0.554
	D	0.94090	0.93516	0.00574	10	0.574	CV
	E	0.94145	0.93583	0.00562	10	0.562	
CONC:	A	0.92765	0.92276	0.00489	10	0.489	AVG DRY WEIGHT (mg)
	B	0.93451	0.92860	0.00591	10	0.591	
	C	0.94144	0.93575	0.00569	10	0.569	0.523
	D	0.94176	0.93540	0.00636	10	0.636	CV
	E	0.94038	0.93707	0.00331	10	0.331	
CONC:	A	0.93440	0.92869	0.00571	10	0.571	AVG DRY WEIGHT (mg)
	B	0.93157	0.92609	0.00548	10	0.548	
	C	0.93726	0.93181	0.00545	10	0.545	0.549
	D	0.93718	0.93228	0.00490	10	0.490	CV
	E	0.93554	0.92962	0.00592	10	0.592	

CV = (STANDARD DEVIATION/MEAN)*100

REMARKS:

WEIGHT DATA FOR LARVAL SURVIVAL AND GROWTH TEST

LAB # / #s:		CLIENT:		ANALYSTS:		SAMPLE ID:		TEST DATES (BEGIN / END):		WEIGHING DATE / TIME:		DRYING TEMP (DEGREES C):		DRYING TIME (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 36	0.93360	0.92925													AVG DRY WEIGHT (mg)
	B 37	0.93178	0.92773													
	C 38	0.93551	0.93120													
	D 39	0.93323	0.92943													CV
	E 40	0.92915	0.92532													
32.1	CONC:	A 41	0.93221	0.92857												AVG DRY WEIGHT (mg)
		B 42	0.93917	0.93369												
		C 43	0.93591	0.93197												
		D 44	0.93852	0.93322												CV
		E 45	0.93594	0.93258												
42.1	CONC:	A 46	0.94284	0.93785												AVG DRY WEIGHT (mg)
		B 47	0.94012	0.93444												
		C 48	0.93924	0.93273												
		D 49	0.94028	0.93571												CV
		E 50	0.93622	0.93079												
56.1	CONC:	A 51	0.93907	0.93344												AVG DRY WEIGHT (mg)
		B 52	0.94347	0.93811												
		C 53	0.94113	0.93580												
		D 54	0.94090	0.93516												CV
		E 55	0.94145	0.93583												
75.1	CONC:	A 56	0.92765	0.92276												AVG DRY WEIGHT (mg)
		B 57	0.93451	0.92860												
		C 58	0.94144	0.93575												
		D 59	0.94176	0.93540												CV
		E 60	0.94038	0.93707												
100.1	CONC:	A 61	0.93440	0.92869												AVG DRY WEIGHT (mg)
		B 62	0.93157	0.92609												
		C 63	0.93726	0.93181												
		D 64	0.93718	0.93228												CV
		E 65	0.93554	0.92962												

CV = (STANDARD DEVIATION/MEAN)*100

REMARKS:

AA# K410771 FATHEAD MINNOW SURVIVAL, 10-29-04
File: k410771s Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

W = 0.301

P = 0.758

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# K410771 FATHEAD MINNOW SURVIVAL, 10-29-04
File: k410771s 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# K410771 FATHEAD MINNOW SURVIVAL, 10-29-04

FILE: k410771s

TRANSFORM: ARC SINE(SQUARE ROOT(Y))

NUMBER OF GROUPS: 6

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	0.9000	1.2490
2	32 % EFFLUENT	1	0.9000	1.2490
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	1.0000	1.4120
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	0.7000	0.9912
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	0.8000	1.1071

AA# K410771 FATHEAD MINNOW SURVIVAL, 10-29-04

File: k410771s 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	1.379				
2	32 % EFFLUENT	1.347	25.00	16.00	5.00	
3	42 % EFFLUENT	1.412	30.00	16.00	5.00	
4	56 % EFFLUENT	1.347	25.00	16.00	5.00	
5	75 % EFFLUENT	1.328	27.00	16.00	5.00	
6	100 % EFFLUENT	1.351	27.00	16.00	5.00	

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

AA # K410771, FATHEAD MINNOW GROWTH, 10-29-04
File: k410771g Transform: NO TRANSFORMATION

Shapiro - Wilk's test for normality

D = 0.141

W = 0.950

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 # K410771, FATHEAD MINNOW GROWTH, 10-29-04
File: k410771g Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 17.64

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 # K410771, FATHEAD MINNOW GROWTH, 10-29-04
FILE: k410771g
TRANSFORM: NO TRANSFORMATION

NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	0.4350	0.4350
1	CONTROL	2	0.4050	0.4050
1	CONTROL	3	0.4310	0.4310
1	CONTROL	4	0.3800	0.3800
1	CONTROL	5	0.3830	0.3830
2	32 % EFFLUENT	1	0.3640	0.3640
2	32 % EFFLUENT	2	0.5480	0.5480
2	32 % EFFLUENT	3	0.3940	0.3940
2	32 % EFFLUENT	4	0.5300	0.5300
2	32 % EFFLUENT	5	0.2810	0.2810
3	42 % EFFLUENT	1	0.4990	0.4990
3	42 % EFFLUENT	2	0.5680	0.5680
3	42 % EFFLUENT	3	0.6510	0.6510
3	42 % EFFLUENT	4	0.4570	0.4570
3	42 % EFFLUENT	5	0.5430	0.5430
4	56 % EFFLUENT	1	0.5630	0.5630
4	56 % EFFLUENT	2	0.5360	0.5360
4	56 % EFFLUENT	3	0.5330	0.5330
4	56 % EFFLUENT	4	0.5740	0.5740
4	56 % EFFLUENT	5	0.5620	0.5620
5	75 % EFFLUENT	1	0.4890	0.4890
5	75 % EFFLUENT	2	0.5910	0.5910
5	75 % EFFLUENT	3	0.5690	0.5690
5	75 % EFFLUENT	4	0.6360	0.6360
5	75 % EFFLUENT	5	0.3310	0.3310
6	100 % EFFLUENT	1	0.5710	0.5710
6	100 % EFFLUENT	2	0.5480	0.5480
6	100 % EFFLUENT	3	0.5450	0.5450
6	100 % EFFLUENT	4	0.4900	0.4900
6	100 % EFFLUENT	5	0.5920	0.5920

AA # K410771, FATHEAD MINNOW GROWTH, 10-29-04
File: k410771g Transform: NO TRANSFORMATION

STEEL'S MANY-ONE RANK TEST

Ho:Control<Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	0.407				
2	32 % EFFLUENT	0.423	27.00	16.00	5.00	
3	42 % EFFLUENT	0.544	40.00	16.00	5.00	
4	56 % EFFLUENT	0.554	40.00	16.00	5.00	
5	75 % EFFLUENT	0.523	35.00	16.00	5.00	
6	100 % EFFLUENT	0.549	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

Discharger: Weston

Analyst: MG JL

Location: 440771

Test Start-Date/Time: 10-29-04/1450

Date Sample Collected: See COC

Test Stop-Date/Time: 11-4-04/10740

Conc 1	Replicate													No. of Young Adults	Young/Adult	Analyst	
	Day	A	B	C	D	E	F	G	H	I	J	J					
%	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	JL
	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	JL
	3	3	0	3	5	2	6	3	4	6	0	0	0	31	10	51	MG
	4	0	0	1	0	0	2	6	0	0	0	0	0	9	10	09	MG
	5	9	9	12	12	10	10	13	12	8	10	10	10	105	10	10.5	MG
	6	12	10	11	10	9	8	10	12	13	12	10	10	107	10	10.7	MG
	7																
	8																
Total	24	19	27	27	24	22	29	27	25	28	25	28	25	252	25.2	CV=12.1%	

Conc 2	Replicate													No. of Young Adults	Young/Adult	Analyst	
	Day	A	B	C	D	E	F	G	H	I	J	J					
%	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	JL
	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	JL
	3	6	5	3	5	5	4	5	7	6	0	0	0	51	10	5.1	MG
	4	0	0	2	0	0	0	0	0	0	0	0	0	2	10	0.2	MG
	5	10	11	8	11	12	11	9	13	10	11	10	10	106	10	10.6	MG
	6	11	9	10	10	11	9	10	11	13	12	10	10	106	10	10.6	MG
	7																
	8																
Total	27	25	23	26	23	26	23	29	30	29	26	29	26	205			

Conc 3	Replicate													No. of Young Adults	Young/Adult	Analyst	
	Day	A	B	C	D	E	F	G	H	I	J	J					
%	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	JL
	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	JL
	3	3	0	4	4	4	5	6	4	4	5	3	4	39	10	3.9	MG
	4	0	3	1	0	0	0	0	0	0	1	5	10	10	10	0.5	MG
	5	9	12	10	13	9	10	11	8	10	7	9	10	99	10	9.9	MG
	6	13	10	9	11	9	11	11	12	10	14	10	10	110	10	11.0	MG
	7																
	8																
Total	25	25	24	28	22	26	28	24	24	24	27	25	25	253			

X=DEAD; Y=MALE

CV# 15.31

$\bar{X} = 23.9$ $CV = 15.31$

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

IDENTIFICATION	NUMBER OF		
	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

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

CRITICAL FISHER'S VALUE (10,10,10) (p=0.05) IS 6. b VALUE IS 9.
 Since b is greater than 6 there is no significant difference
 between CONTROL and TREATMENT at the 0.05 level.

SUMMARY OF FISHER'S EXACT TESTS

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	1	

AA# K410771, CERIODAPHNIA REPRODUCTION, 10-29-04
File: k410771c 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# K410771, CERIODAPHNIA REPRODUCTION, 10-29-04
File: k410771c Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 27.01

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# K410771, CERIODAPHNIA REPRODUCTION, 10-29-04
 FILE: k410771c
 TRANSFORM: NO TRANSFORMATION

NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	24.0000	24.0000
1	CONTROL	2	19.0000	19.0000
1	CONTROL	3	27.0000	27.0000
1	CONTROL	4	27.0000	27.0000
1	CONTROL	5	24.0000	24.0000
1	CONTROL	6	22.0000	22.0000
1	CONTROL	7	29.0000	29.0000
1	CONTROL	8	27.0000	27.0000
1	CONTROL	9	25.0000	25.0000
1	CONTROL	10	28.0000	28.0000
2	32 % EFFLUENT	1	27.0000	27.0000
2	32 % EFFLUENT	2	25.0000	25.0000
2	32 % EFFLUENT	3	23.0000	23.0000
2	32 % EFFLUENT	4	26.0000	26.0000
2	32 % EFFLUENT	5	28.0000	28.0000
2	32 % EFFLUENT	6	25.0000	25.0000
2	32 % EFFLUENT	7	23.0000	23.0000
2	32 % EFFLUENT	8	29.0000	29.0000
2	32 % EFFLUENT	9	30.0000	30.0000
2	32 % EFFLUENT	10	29.0000	29.0000
3	42 % EFFLUENT	1	25.0000	25.0000
3	42 % EFFLUENT	2	25.0000	25.0000
3	42 % EFFLUENT	3	24.0000	24.0000
3	42 % EFFLUENT	4	28.0000	28.0000
3	42 % EFFLUENT	5	22.0000	22.0000
3	42 % EFFLUENT	6	26.0000	26.0000
3	42 % EFFLUENT	7	28.0000	28.0000
3	42 % EFFLUENT	8	24.0000	24.0000
3	42 % EFFLUENT	9	24.0000	24.0000
3	42 % EFFLUENT	10	27.0000	27.0000
4	56 % EFFLUENT	1	31.0000	31.0000
4	56 % EFFLUENT	2	31.0000	31.0000
4	56 % EFFLUENT	3	26.0000	26.0000
4	56 % EFFLUENT	4	30.0000	30.0000
4	56 % EFFLUENT	5	26.0000	26.0000
4	56 % EFFLUENT	6	21.0000	21.0000
4	56 % EFFLUENT	7	28.0000	28.0000
4	56 % EFFLUENT	8	32.0000	32.0000
4	56 % EFFLUENT	9	24.0000	24.0000
4	56 % EFFLUENT	10	28.0000	28.0000
5	75 % EFFLUENT	1	24.0000	24.0000
5	75 % EFFLUENT	2	29.0000	29.0000
5	75 % EFFLUENT	3	26.0000	26.0000
5	75 % EFFLUENT	4	23.0000	23.0000
5	75 % EFFLUENT	5	27.0000	27.0000
5	75 % EFFLUENT	6	25.0000	25.0000
5	75 % EFFLUENT	7	28.0000	28.0000
5	75 % EFFLUENT	8	33.0000	33.0000
5	75 % EFFLUENT	9	29.0000	29.0000

5	75 %	EFFLUENT	10	28.0000	28.0000
6	100 %	EFFLUENT	1	22.0000	22.0000
6	100 %	EFFLUENT	2	20.0000	20.0000
6	100 %	EFFLUENT	3	18.0000	18.0000
6	100 %	EFFLUENT	4	26.0000	26.0000
6	100 %	EFFLUENT	5	27.0000	27.0000
6	100 %	EFFLUENT	6	21.0000	21.0000
6	100 %	EFFLUENT	7	27.0000	27.0000
6	100 %	EFFLUENT	8	26.0000	26.0000
6	100 %	EFFLUENT	9	0.0000	0.0000
6	100 %	EFFLUENT	10	28.0000	28.0000

AA# K410771, CERIODAPHNIA REPRODUCTION, 10-29-04
 File: k410771c Transform: NO TRANSFORMATION

STEEL'S MANY-ONE RANK TEST

Ho: Control < Treatment

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	25.200				
2	32 % EFFLUENT	26.500	117.00	75.00	10.00	
3	42 % EFFLUENT	25.300	103.00	75.00	10.00	
4	56 % EFFLUENT	27.700	126.00	75.00	10.00	
5	75 % EFFLUENT	27.200	122.00	75.00	10.00	
6	100 % EFFLUENT	21.500	90.00	75.00	10.00	

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



APPENDIX E

Organism History

AQUATOX, INC.

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

TEST ORGANISM HISTORY

DATE SHIPPED 10-28-04 Arkansas Analytical

SPECIES Pimephales promelas

QUANTITY SHIPPED 800⁺ & 300⁺

AGE/LIFE STAGE 4 ykms 10/28 - 5 Days old 10/28

BROODSTOCK SOURCE Anderson Farms, AR

CULTURE WATER granulocita

ALKALINITY (Mg/l as CaCO₃) = 180

HARDNESS (Mg/l as CaCO₃) / Salinity (ppt) = 160

FEEDING AF Firm in

COMMENTS _____

PACKAGED BY llm

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: 1/17/01

SPECIES: Ceriodaphnia dubia

AGE: Variable

LIFE STAGE: Adult

HATCH DATE: Variable

BEGAN FEEDING: Immediately

FOOD: YTC, Selenastrum

Water Chemistry Record:

	Mean	Range
TEMPERATURE:	<u>24 °C</u>	<u>21-24°C</u>
SALINITY/CONDUCTIVITY:	<u>--</u>	<u>--</u>
TOTAL HARDNESS (as CaCO ₃):	<u>112 mg/l</u>	<u>90-124 mg/l</u>
TOTAL ALKALINITY (as CaCO ₃):	<u>85 mg/l</u>	<u>50-85 mg/l</u>
pH:	<u>8.09</u>	<u>7.68-8.14</u>

Comments:



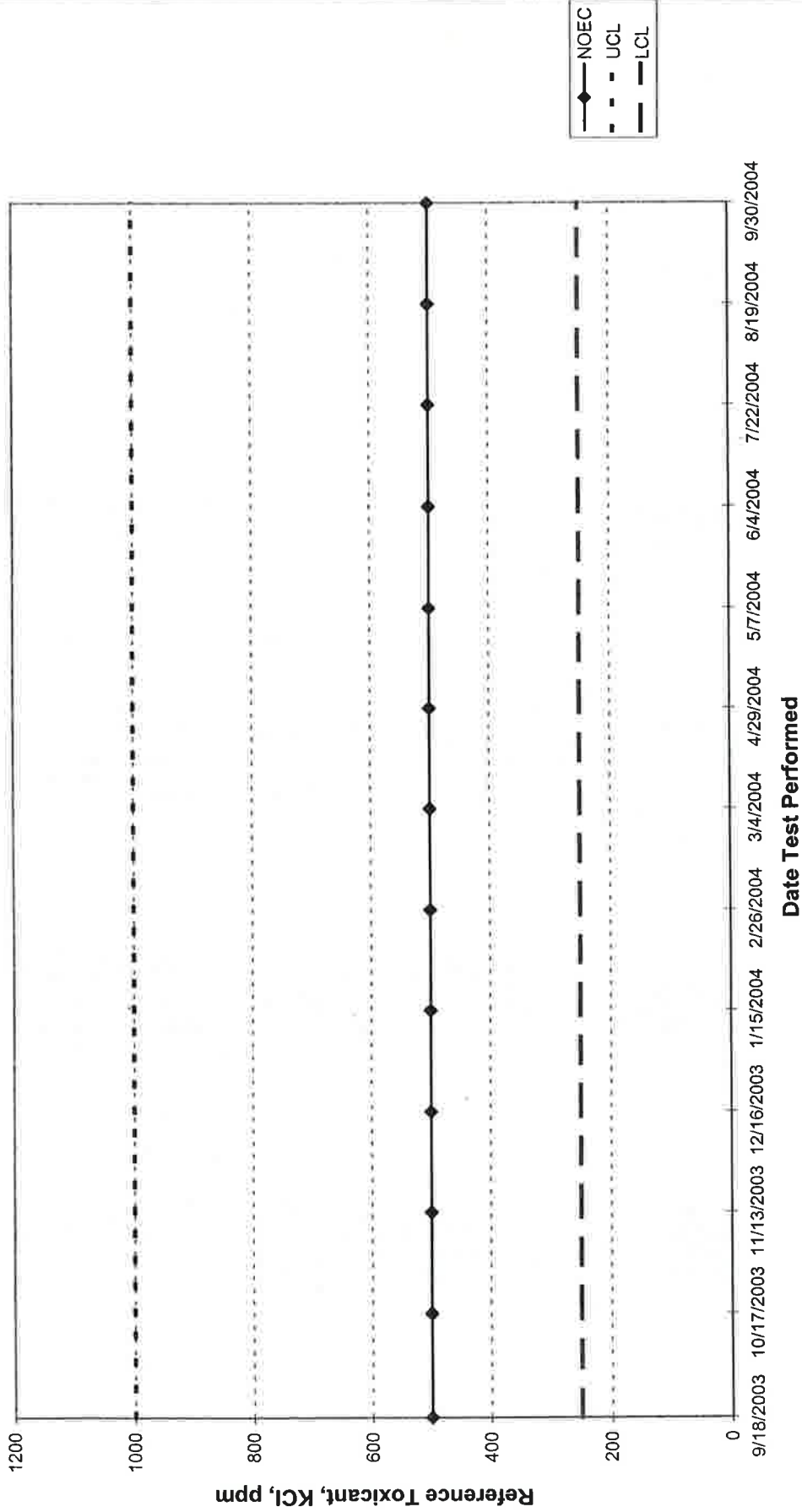
Facility Supervisor



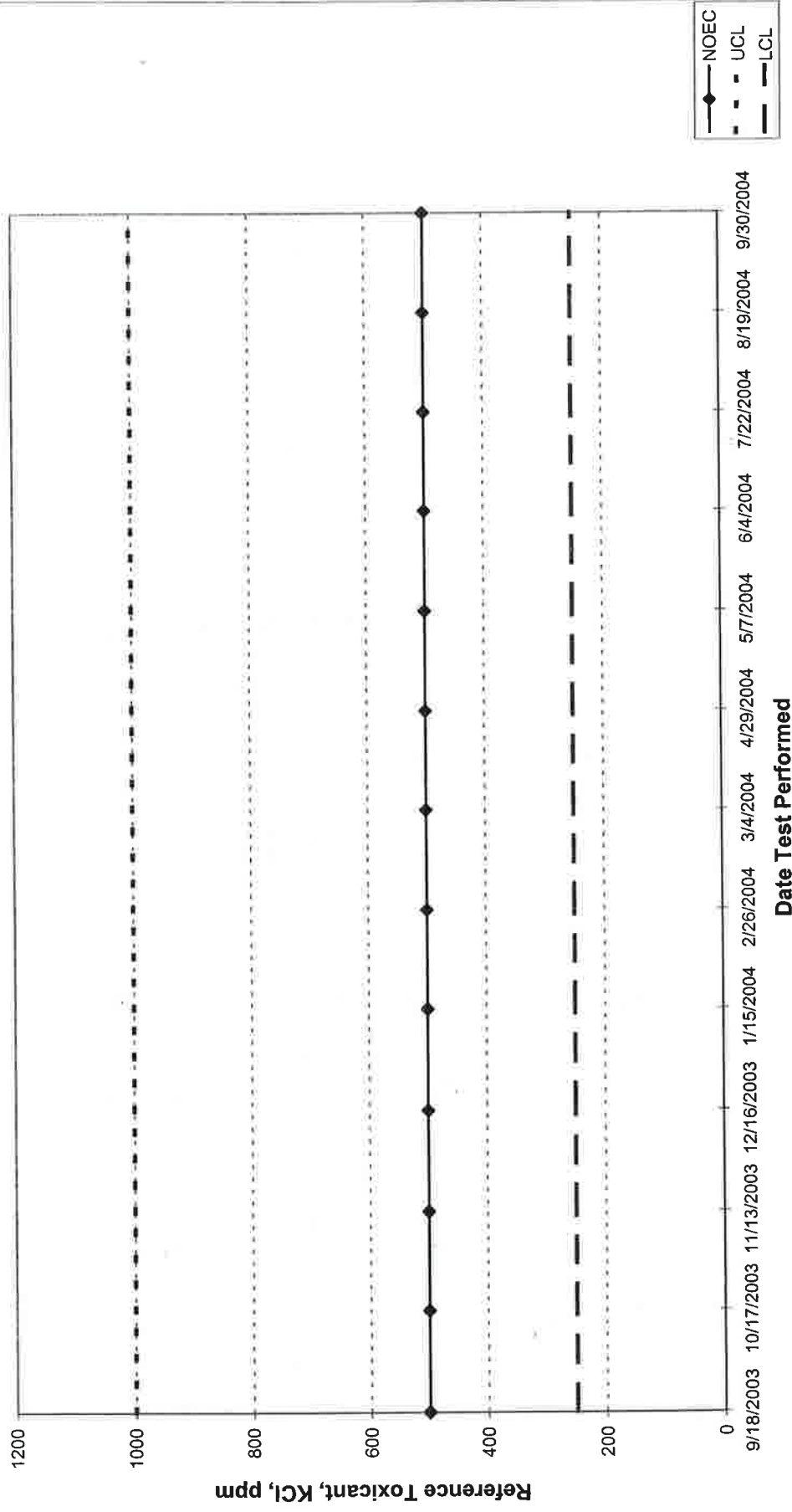
APPENDIX F

Quality Assurance Charts

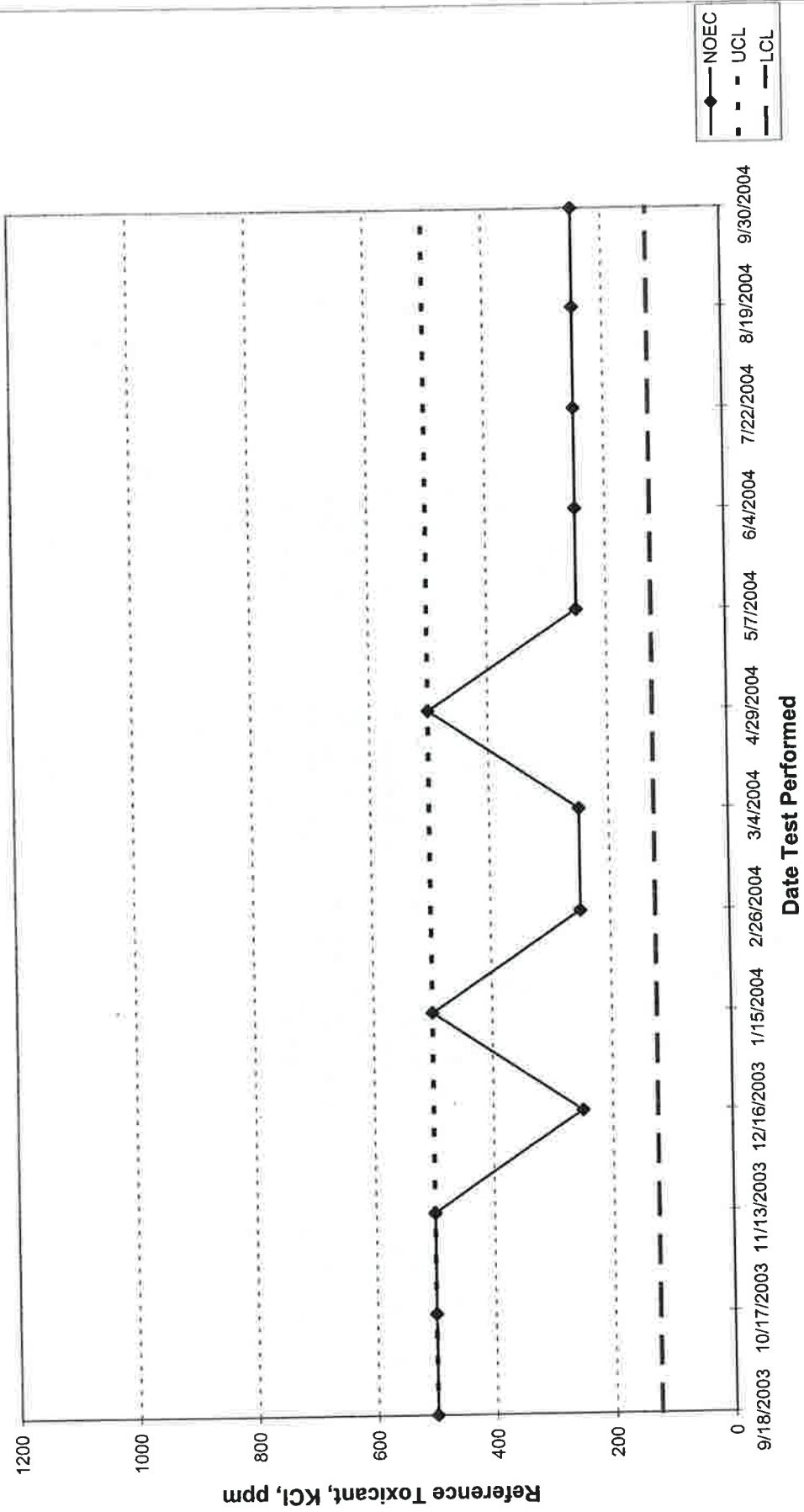
ARKANSAS ANALYTICAL, INC.
FATHEAD MINNOW SURVIVAL
QUALITY ASSURANCE



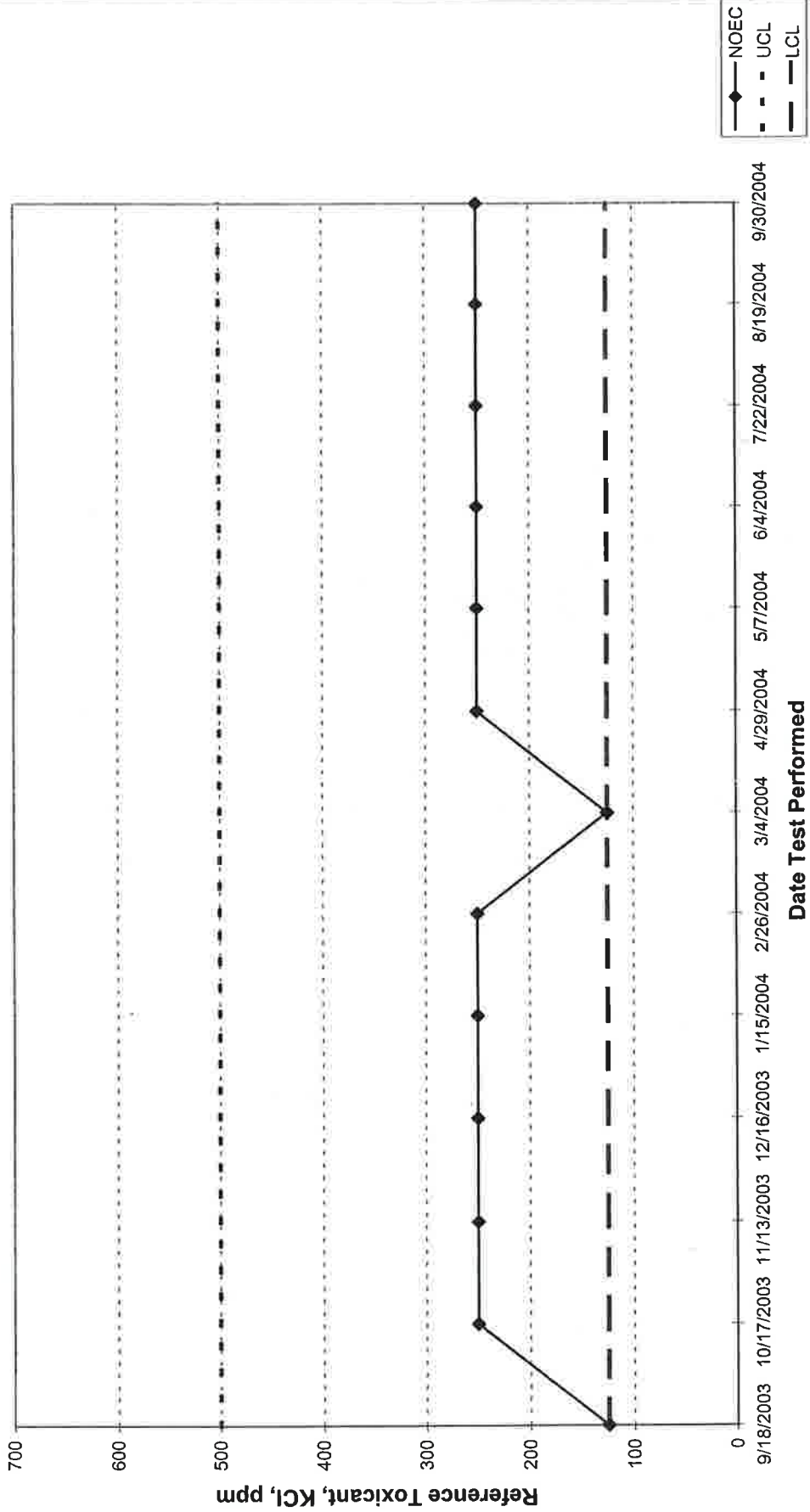
ARKANSAS ANALYTICAL, INC.
FATHEAD MINNOW GROWTH
QUALITY ASSURANCE



ARKANSAS ANALYTICAL, INC.
CERIODAPHNIA DUBIA SURVIVAL
QUALITY ASSURANCE



ARKANSAS ANALYTICAL, INC.
CERIODAPHNIA DUBIA REPRODUCTION
QUALITY ASSURANCE





APPENDIX G

Lab Certification



State of Arkansas
 Department of Environmental Quality
 Laboratory Certification Program



Be it known that
 Arkansas Analytical, Inc
 Little Rock, Arkansas
 has earned certification by this Department for the period of
 October 30, 2003 to October 30, 2004

Laboratory ID # 60-1754

Certificate # 03-079-0

The following parameters are certified:

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

J. S. Semberki
 Quality Assurance Officer

October 24, 2003
 Date

ARKANSAS ANALYTICAL, INCORPORATED
11701 I-30, BUILDING 1, SUITE 115
LITTLE ROCK, AR 72209

Laboratory Control Number: K410771 Date: 11-22-04

Client: Weston Sample ID: _____

Pass **Fail**

Fathead Minnow Survival Test ✓ _____

Fathead Minnow Growth Test ✓ _____

Ceriodaphnia dubia Survival Test ✓ _____

Ceriodaphnia dubia Reproduction Test ✓ _____

Analyst Initials YMA