Arkansas Analytical, Inc.

Toxicity Test Results

MAGCOBAR MINE SITE
NPDES PERMIT NUMBER: AR0049794
April, 2006

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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P.O. Box 232
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Lab Number 0604185

Wednesday, May 17, 2006

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 April of 2006.

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:	4-18-06, 0830	4-19-06, 0830
Sample #2:	4-22-06, 0830	4-23-06, 0830
Sample #3:	4-24-06, 0830	4-25-06, 0830

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:	4-19-06, 1117	4
Sample #2:	4-23-06, 0950	4
Sample #3:	4-25-06, 0930	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 eight organisms in a test solution volume of 250 mls. The alternate method suggested in the method (11.3.4.5) for combating pathogen interference, was also run parallel to 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 remained the same (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	27.6	X	
At least 60% of surviving females should have produced 3 broods	80%	X	
The percent coefficient of variation between replicates must be 40% or less for the young of surviving females	23.6%	X	

TEST ACCEPTANCE CRITERIA for *Pimephales promelas*

Control Criteria	Results	Pass	Fail
Greater than or equal to 80% survival	92.5%	X	
The percent coefficient of variation between replicates must be 40% or less for survival	7.40%	X	
Minimum of 0.25 mg average dry weight of surviving controls	0.655	X	
The percent coefficient of variation between replicates must be 40% or less for growth	6.44%	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		*Pimephales promelas*	
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

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)	30.5	%CV survival (critical dilution)	7.21%
%CV Reproduction (critical dilution)	20.1%	Mean dry weight (critical dilution) in milligrams	0.837
		%CV growth (critical dilution)	15.8%

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

Ken Pigue

Trip Tennison

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:	4-18-06, 0830	4-19-06, 0830
Sample #2:	4-22-06, 0830	4-23-06, 0830
Sample #3:	4-24-06, 0830	4-25-06, 0830

Test initiated (date, time): 4-20-06, 1500 Test terminated (date, time): 4-27-06, 1100

Dilution water used: Soft Synthetic

DATA TABLE FOR FATHEAD MINNOW SURVIVAL

	Percent Survival in Replicate Chambers						**Mean Percent Survival**			
Effluent Conc %	A	B	C	D	E		24 hours	48 hours	7 days	CV %
0%	100	87.5	87.5	87.5	100		100	100	92.5	7.40
32%	100	87.5	100	87.5	100		95	95	95	
42%	100	87.5	75	75	87.5		97.5	97.5	85	
56%	100	87.5	100	100	100		100	100	97.5	
75%	75	100	100	100	100		100	100	95	
100%	100	87.5	100	87.5	100		97.5	95	95	7.21

DATA TABLE FOR GROWTH OF FATHEAD MINNOWS

Average Dry Weight in milligrams in replicate chambers

Effluent Conc %	A	B	C	D	E		Mean Dry Weight	CV%
0%	0.714	0.601	0.674	0.635	0.650		0.655	6.47
32%	0.762	0.675	0.951	0.561	0.759		0.742	
42%	0.782	0.726	0.625	0.647	0.692		0.694	
56%	0.655	0.635	0.836	0.749	0.894		0.754	
75%	0.686	0.794	0.735	0.768	0.804		0.757	
100%	0.676	0.716	0.975	0.908	0.909		0.837	15.8

Coefficient of Variation = standard deviation / mean * 100

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:	4-18-06, 0830	4-19-06, 0830
Sample #2:	4-22-06, 0830	4-23-06, 0830
Sample #3:	4-24-06, 0830	4-25-06, 0830

Test initiated (date, time): 4-20-06, 1500 Test terminated (date, time): 4-27-06, 1100

Dilution water used: Soft Synthetic

DATA TABLE FOR FATHEAD MINNOW SURVIVAL
ALTERNATE METHOD (SUMMARY)

	Percent Survival in Replicate Chambers						Mean Percent Survival			
Effluent Conc %	A	B	C	D	E		24 hours	48 hours	7 days	CV %
0%	87.5	62.5	87.5	87.5	75		97.5	95	80	14.0
32%	87.5	100	87.5	100	87.5		100	95	92.5	
42%	75	87.5	100	62.5	100		100	97.5	85	
56%	75	100	87.5	87.5	87.5		95	92.5	87.5	
75%	75	100	100	100	100		100	100	95	
100%	100	100	75	87.5	87.5		95	95	90	11.6

DATA TABLE FOR GROWTH OF FATHEAD MINNOWS
ALTERNATE METHOD

Average Dry Weight in milligrams in replicate chambers

Effluent Conc %	A	B	C	D	E		Mean Dry Weight	CV%
0%	0.299	0.289	0.436	0.386	0.341		0.350	17.6
32%	0.337	0.398	0.404	0.440	0.358		0.387	
42%	0.264	0.368	0.399	0.202	0.444		0.335	
56%	0.419	0.479	0.374	0.429	0.429		0.426	
75%	0.386	0.467	0.368	0.394	0.390		0.401	
100%	0.433	0.482	0.431	0.449	0.409		0.441	6.20

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)= _____**7.40**_____%

Arkansas Analytical Inc.

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:	4-18-06, 0830	4-19-06, 0830
Sample #2:	4-22-06, 0830	4-23-06, 0830
Sample #3:	4-24-06, 0830	4-25-06, 0830

Test initiated (date, time): 4-20-06, 1030 Test terminated (date, time): 4-26-06, 0900

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	29	22	32	27	34
B	17	30	8	32	22	29
C	27	25	18	33	29	33
D	38	28	34	27	35	23
E	27	26	26	28	23	40
F	29	35	28	34	33	30
G	24	26	24	24	34	25
H	28	23	23	30	34	26
I	36	23	31	29	31	25
J	X0	25	22	28	33	40
Mean	24.8	27.0	23.6	29.7	30.1	30.5
Mean/surviving female	27.6	27.0	23.6	29.7	30.1	30.5
CV%*	23.6					20.1

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)= _____**23.6**_____%

APPENDIX A

Chain of Custody Forms

CHAIN OF CUSTODY RECORD

CLIENT INFORMATION	Project Description	Turnaround Time
EEMA O&M INC.	MAGCOBAR Mine Site	(CIRCLE ONE)
P.O. Box 699	Reporting Information	24 hour
2000 Darby Lane	Telephone: 501/467-8355	48 hour
Malvern, AR 72104	FAX: 501/467-8687	routine
Attn: Darrel Scott	Bill to/P.O	Preservative Code:
		Bottle Type

Preservation Codes:

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) Bob Dam

Samplers:(Printed) Bob Dam

Field Number	Sample Collection Date/s	Time/s	Grab	Comp	# of Containers	Sample Matrix	SAMPLE IDENTIFICATION/ DESCRIPTION	TEST PARAMETERS: Chronic Bio	Arkansas Analytical Lab #
FD419COMP	4/19/2006	830		X	7		Facilty Discharge	X	0604185-01

Bottle type code: G=glass;P=HDPE V=septum;A=amber

1 Relinquished by:(Signature)	Date/Time	1.Received by:(Signature)
Bob Dam	041906 1117	
2.Relinquished by:(Signature)	Date/Time	2.Received by laboratory :(Signature)
	4-19-06 1117	Sydney James

For completion by laboratory

Condition of samples:	yes	no
A. Containers Correct:?	✓	
B. Preservation Correct:?	✓	
C. Seals Intact:?	✓	

REMARKS

Temp. on Receipt - 10°C

ARKANSAS ANALYTICAL, INC. ** 11701 I-30, Bldg 1, Suite 115**Little Rock, Arkansas 72209**phone(501)455-3233**Fax(501)455-6118

CHAIN OF CUSTODY RECORD

CLIENT INFORMATION	Project Description	Turnaround Time
EEMA O&M INC.	MAGCOBAR Mine Site	(CIRCLE ONE)
P.O. Box 699	Reporting Information	24 hour
2000 Darby Lane	Telephone: 501/467-8355	48 hour
Malvern, AR 72104	FAX: 501/467-8687	routine
Attn: BOB DAVIS	Bill to/P.O.	Preservative Code:
		Bottle Type

Preservation Codes:

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): Rondall Lambert

Samplers:(Printed): RANDALL LAMBERT

Field Number	Sample Collection Date/s	Time/s	Grab	Comp	# of Containers	Sample Matrix	SAMPLE IDENTIFICATION/ DESCRIPTION	Chronic Bio	TEST PARAMETERS	Bottle type code G=glass;P=HDPE V=septum;A=amber	Arkansas Analytical Lab #
								P			
FD4230830	4/23/2006	8:30		X	5		Facilty Discharge	X			060485-02

1 Relinquished by:(Signature)	Date/Time	1.Received by:(Signature)
Rondall Lambert	9:50 4-23-06	
2.Relinquished by:(Signature)	Date/Time	2.Received by laboratory :(Signature)

For completion by laboratory

Condition of samples:	yes	no
A. Containers Correct:?		
B. Preservation Correct:?		
C. Seals Intact:?		

REMARKS

Sample temp = 6°C upon arrival at lab. T.T.

CHAIN OF CUSTODY RECORD

CLIENT INFORMATION	Project Description	Turnaround Time	Preservation Codes:	
EEMA O&M INC.	MAGCOBAR Mine Site	(CIRCLE ONE)	1. Cool, 4 degrees Centigrade	4. Thiosulfate for dechlorination
P.O. Box 699	Reporting Information	24 hour	2. Sulfuric Acid, pH <2	5. Hydrochloric Acid for VOA
2000 Darby Lane	Telephone: 501/467-3385	48 hour	3. Nitric Acid, pH <2	6. Sodium Hydroxide, pH >12
Malvern, AR 72104	FAX: 501/467-3687	routine	TEST PARAMETERS	Bottle type code
Attn: Darrel Scott	Bill to/P O	Preservative Code		G=glass; P=HDPE
		Bottle Type	P	V=septum, A=amber

Samplers:(Signature/s): Bill Horton

Samplers (Printed): Bill Horton

Field Number	Sample Collection Date/s	Sample Collection Time/s	Grab	Comp	# of Containers	Sample Matrix	SAMPLE IDENTIFICATION/ DESCRIPTION	Chronic Bio	Arkansas Analytical Lab #
FD 4/25/06	4/25/2006	8:30		X	5		Facility Discharge	X	0604185-03

1.Relinquished by:(Signature)	Date/Time	1.Received by:(Signature)	For completion by laboratory	yes	no	REMARKS
Bill Horton	4-25-06 09:30		Condition of samples:			Temp on Receipt - 1°C
			A. Containers Correct?	✓		
2.Relinquished by:(Signature)	Date/Time	2.Received by laboratory:(Signature)	B. Preservation Correct?	✓		
	4-25-06. 0930	Sydney James	C. Seals Intact?	✓		

APPENDIX B

Effluent and Dilution Water Data

CHEMICAL DATA SHEET FOR CHRONIC TOXICITY TESTING — Fathead Minnow

Lab # / Sample ID: 060485 — Test Start (Date/Time): 4/20/06 1500

Client: Weston (FEMA) — Test End (Date/Time): 4-27-06 1100

		Day of Test 1	2	3	4	5	6	7	notes/remarks
Control	Control	4/20	4/21	4/22	4/23	4/24	4/25	4/26	SS 151
D.O (mg/L)	INITIAL	6.0	6.1	4.3	4.5	9.4	~~10.3~~	~~11.7~~	
	FINAL	5.8	4.9	5.3	7.8	7.7	~~12.5~~	8.8	
pH(mg/L)	INITIAL	8.0	7.1	8.0	6.9	8.3	6.7	7.3	
	FINAL	7.9	7.5	7.4	8.0	7.4	7.9	7.3	
temp(C)	INITIAL	17.2	20.9	20.0	21.5	21.1	20.9	19.9	
	FINAL	20.1	25.0	25.0	25.0	21.4	25.0	25.0	
ALKALINITY(mg/L)		26	→	→	→	→	→	→	
HARDNESS(mg/L)		38	→	→	→	→	→	→	
CONDUCTIVITY(umhos/cm)		153	→	→	→	→	→	→	
CHLORINE(mg/L)		<0.05	→	→	→	→	→	→	
CONC:	32%	32%	32%	32%	32%	32%	32%	32%	
D.O (mg/L)	INITIAL	6.0	5.9	5.1	4.7	9.6	~~10.3~~	~~11.4~~	*Some D.O. readings estimated due to equipment malfunction
	FINAL	4.8	3.6	4.8	7.9	8.4	~~11.8~~	8.8	
pH(mg/L)	INITIAL	8.1	7.2	7.5	7.2	8.3	6.3	7.1	
	FINAL	7.3	7.2	7.4	7.5	7.0	7.4	7.1	
temp(C)	INITIAL	17.3	21.2	20.0	21.4	21.7	21.0	19.6	
	FINAL	20.4	~~20.0~~ 25.0	25.0	25.0	21.5	25.0	25.0	
CONC:	42%	42%	42%	42%	42%	42%	42%	42%	
D.O (mg/L)	INITIAL	6.0	6.0	5.2	4.4	9.5	~~10.4~~	~~11.8~~	
	FINAL	7.0	4.0	5.0	7.9	9.3	~~11.9~~	9.0	
pH(mg/L)	INITIAL	7.9	7.6	7.7	7.5	8.4	6.5	7.8	
	FINAL	7.3	7.3	7.4	7.5	7.0	7.4	7.1	
temp(C)	INITIAL	17.3	21.3	20.1	21.4	22.0	21.3	19.3	
	FINAL	20.3	25.0	25.0	25.0	21.2	25.0	25.0	
CONC:	56%	56%	56%	56%	56%	56%	56%	56%	
D.O (mg/L)	INITIAL	5.9	5.8	5.1	5.0	9.2	~~10.1~~	~~11.5~~	
	FINAL	5.1	4.4	4.9	8.3	8.1	~~11.8~~	9.0	
pH(mg/L)	INITIAL	8.5	7.8	7.9	7.9	8.5	6.7	7.8	
	FINAL	7.3	7.3	7.4	7.4	7.0	7.3	7.1	
temp(C)	INITIAL	17.4	21.3	20.3	21.4	22.4	21.5	19.9	
	FINAL	20.3	25.0	25.0	25.0	20.9	25.0	25.0	
CONC:	75%	75%	75%	75%	75%	75%	75%	75%	
D.O (mg/L)	INITIAL	5.9	6.1	5.7	5.2	8.6	~~9.9~~	~~11.7~~	
	FINAL	6.1	4.6	5.6	8.3	8.6	~~12.4~~	9.1	
pH(mg/L)	INITIAL	8.5	8.1	8.7	8.2	8.6	6.9	7.9	
	FINAL	7.5	7.3	7.4	7.3	7.0	7.2	7.1	
temp(C)	INITIAL	17.4	21.2	20.5	21.4	22.6	21.7	19.9	
	FINAL	20.2	25.0	25.0	25.0	21.0	25.0	25.0	
CONC:	100%	100%	100%	100%	100%	100%	100%	100%	
D.O (mg/L)	INITIAL	6.1	6.0	4.9	5.5	8.8	~~9.9~~	~~12.1~~	
	FINAL	5.8	4.8	4.5	8.5	8.6	~~12.2~~	9.4	
pH(mg/L)	INITIAL	7.9	6.8	9.2	8.7	8.8	7.0	8.5	
	FINAL	7.5	6.7	7.0	7.3	7.0	7.2	7.1	
temp(C)	INITIAL	17.5	21.2	20.7	21.6	22.6	21.6	20.4	
	FINAL	20.1	25.0	25.0	25.0	21.0	25.0	25.0	
CONC:	100%	A	A	A	B	B	C	C	
ALKALINITY((mg/L)		20	→	→	7	→	9	→	
HARDNESS(mg/L)		1210	→	→	1400	→	1400	→	
CONDUCTIVITY(umhos/cm)		2340	→	→	2330	→	2330	→	
CHLORINE(mg/L)		<0.05	→	→	<0.05	→	<0.05	→	

CHEMICAL DATA SHEET FOR CHRONIC TOXICITY TESTING — Ceriodaphnia dubia

Lab # / Sample ID: 0V04185 — Test Start (Date/Time): 4/20/06 1500

Client: Weston (EEMA) — Test End (Date/Time): 4/26/06 0900

		Day of Test 1	2	3	4	5	6	7	8	notes/remarks
Control	Control	4/20	4/21	4/22	4/23	4/24	4/25			SS 151
D.O (mg/L)	INITIAL	6.0	6.1	4.6	4.5	9.4	~~10.3~~			
	FINAL	10.6	3.5	8.5	9.6	9.8	9.5			
pH	INITIAL	8.0	7.1	8.0	6.9	8.3	6.7			
	FINAL	7.9	7.2	8.2	6.6	7.9	7.9			
temp(C)	INITIAL	17.2	20.9	19.7	21.5	21.1	20.9			
	FINAL	25.0	25.0	25.0	25.0	~~25.0~~	25.0			
ALKALINITY(mg/L)		26	→	→	→	→	→			
HARDNESS(mg/L)		38	→	→	→	→	→			
CONDUCTIVITY(umhos/cm)		153	→	→	→	→	→			
CHLORINE(mg/L)		<0.05	→	→	→	→	→			*Some D.O. readings estimated due to equipment malfunction
CONC:	32%	32%	32%	32%	32%	32%	32%			
D.O (mg/L)	INITIAL	6.0	6.1	5.3	4.7	9.6	~~10.3~~			
	FINAL	10.6	3.5	8.5	9.5	~~11.7~~	9.6			
pH	INITIAL	8.1	8.2	8.1	7.2	8.3	6.3			
	FINAL	7.6	7.1	7.8	6.4	7.4	7.4			
temp(C)	INITIAL	17.3	21.1	19.6	21.4	21.7	21.0			
	FINAL	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	6.0	5.9	5.3	4.4	9.5	~~10.1~~			
	FINAL	10.5	3.9	8.3	9.3	~~12.3~~	9.6			
pH	INITIAL	7.9	8.1	8.0	7.5	8.4	6.5			
	FINAL	7.6	7.3	7.7	6.5	7.3	7.3			
temp(C)	INITIAL	17.3	21.2	19.6	21.4	22.0	21.3			
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0			
CONC:	56%	56%	56%	56%	56%	56%	56%			
D.O (mg/L)	INITIAL	5.9	6.0	5.1	5.0	9.2	~~10.1~~			
	FINAL	10.2	4.2	8.3	9.3	~~12.1~~	9.6			
pH	INITIAL	8.5	8.1	8.0	7.9	8.5	6.7			
	FINAL	7.3	7.5	7.0	6.6	7.2	7.2			
temp(C)	INITIAL	17.4	21.0	19.7	21.4	22.4	21.5			
	FINAL	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	5.9	6.1	5.4	5.2	8.6	~~9.9~~			
	FINAL	10.4	4.2	7.9	9.7	~~12.1~~	9.4			
pH	INITIAL	8.5	8.0	8.0	8.2	8.6	7.0			
	FINAL	7.3	7.5	7.5	6.4	7.2	7.0			
temp(C)	INITIAL	17.4	21.2	19.9	21.4	22.6	21.6			
	FINAL	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	6.1	5.9	5.2	5.5	8.8	~~9.9~~			
	FINAL	10.5	4.3	8.2	9.4	~~12.1~~	9.4			
pH	INITIAL	8.9	8.1	7.9	8.7	7.0	6.9			
	FINAL	7.1	7.3	7.2	6.7	7.0	7.1			
temp(C)	INITIAL	17.5	20.9	20.2	21.6	22.6	21.7			
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0			
CONC:	100%	A	A	A	B	B	C			
ALKALINITY((mg/L)		20	→	→	7	→	9			
HARDNESS(mg/L)		1210	→	→	1400	→	1400			
CONDUCTIVITY(umhos/cm)		2340	→	→	2330	→	2330			
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 060485 TEST START DATE 4/20 TIME 1500

CLIENT Weston TEST END DATE 4/27 TIME 1000

AGE AND SOURCE OF MINNOWS <24 hrs; Aquatox

		DAY (NUMBER SURVIVING)								SURVIVAL		
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: Control	A	8	8	8	8	8	8	8	8	100	92.5	7.40%
	B	8	8	8	8	7	7	7	7	87.5		
	C	8	8	8	7	7	7	7	7	87.5		
	D	8	8	8	8	8	8	8	7	87.5		
	E	8	8	8	8	8	8	8	8	100		
CONC: 32%	A	8	8	8	8	7	8	8	8	100	95	
	B	8	7	7	7	7	7	7	7	87.5		
	C	8	8	8	8	8	8	8	8	100		
	D	8	7	7	7	7	7	7	7	87.5		
	E	8	8	8	8	8	8	8	8	100		
CONC: 42%	A	8	8	8	8	8	8	8	8	100	85	
	B	8	8	8	8	8	7	7	7	87.5		
	C	8	8	8	8	7	7	6	6	75		
	D	8	7	7	7	6	6	6	6	75		
	E	8	8	8	8	8	8	8	7	87.5		
CONC: 56%	A	8	8	8	8	8	8	8	8	100	97.5	
	B	8	8	8	7	7	7	7	7	87.5		
	C	8	8	8	8	8	8	8	8	100		
	D	8	8	8	8	8	8	8	8	100		
	E	8	8	8	8	8	8	8	8	100		
CONC: 75%	A	8	8	8	8	7	6	6	6	75	95	
	B	8	8	8	8	8	8	8	8	100		
	C	8	8	8	8	8	8	8	8	100		
	D	8	8	8	8	8	8	8	8	100		
	E	8	8	8	8	8	8	8	8	100		
CONC: 100%	A	8	8	8	8	8	8	8	8	100	95	7.21%
	B	8	7	7	7	7	7	7	7	87.5		
	C	8	8	8	8	8	8	8	8	100		
	D	8	8	7	7	7	7	7	7	87.5		
	E	8	8	8	8	8	8	8	8	100		
ANALYST:		KP	KP/KB	TT	TT	KP	JM	KP	KP			
DATE:		4/20	4/21	4/22	4/23	4/24	4-25	4/26	4/27			
TIME:		1500	1420	1300	1230	1525	1545	1550	1100			

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

SURVIVAL DATA FOR FATHEAD MINNOW LARVAL SURVIVAL AND GROWTH TEST

LAB #/ SAMPLE ID 0604185 TEST START DATE 4/20/16 TIME 1500

CLIENT Weston Alt Seminary TEST END DATE 4/27 TIME 1100

AGE AND SOURCE OF MINNOWS <24 hrs, Aquatox

		DAY (NUMBER SURVIVING)								SURVIVAL		
	REP #	start	1	2	3	4	5	6	7	%	MEAN %	CV
CONC: Control	A	8	8	8	7	7	7	7	7	87.5	80	14.0%
	B	8	8	8	6	6	5	5	5	62.5		
	C	8	8	8	7	7	7	7	7	87.5		
	D	8	8	7	7	7	7	7	7	87.5		
	E	8	7	7	7	6	6	6	6	75		
CONC: 32%	A	8	8	7	7	7	7	7	7	87.5	92.5	
	B	8	8	8	8	8	8	8	8	100		
	C	8	8	7	7	7	7	7	7	87.5		
	D	8	8	8	8	8	8	8	8	100		
	E	8	8	8	7	7	7	7	7	87.5		
CONC: 42%	A	8	8	8	8	7	7	6	6	75	85	
	B	8	8	7	7	7	7	7	7	87.5		
	C	8	8	8	8	8	8	8	8	100		
	D	8	8	8	6	6	6	5	5	62.5		
	E	8	8	8	8	8	8	8	8	100		
CONC: 56%	A	8	6	6	6	6	6	6	6	75	87.5	
	B	8	8	8	8	8	8	8	8	100		
	C	8	8	7	7	7	7	7	7	87.5		
	D	8	8	8	8	8	8	8	7	87.5		
	E	8	8	8	7	7	7	7	7	87.5		
CONC: 75%	A	8	8	8	7	6	6	6	6	75	90	
	B	8	8	8	8	8	8	8	8	100		
	C	8	8	8	8	8	8	8	8	100		
	D	8	8	8	8	8	8	8	8	100		
	E	8	8	8	8	8	8	8	6	75		
CONC: 100%	A	8	8	8	8	8	8	8	8	100	90	11.6%
	B	8	8	8	8	8	8	8	8	100		
	C	8	7	7	7	7	7	7	6	75		
	D	8	8	8	8	8	8	8	7	87.5		
	E	8	7	7	7	7	7	7	7	87.5		
ANALYST:		KP	KP/KA	TT	TT	KP	JM	KP	KP			
DATE:		4/20	4/21	4/22	4/23	4/24	4-25	4/26	4/27			
TIME:		1500	1420	1300	1230	1525	1545	1550	1100			

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:	604185				TEST DATES (BEGIN / END):		4/20-27/06	
CLIENT:	EEMA				WEIGHING DATE / TIME:		5/1/06, 1015	
ANALYSTS:	jm, 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	0.99714	0.99143	0.00571	8	0.714	AVG DRY	
	B	1.02681	1.02200	0.00481	8	0.601	WEIGHT (mg)	
	C	0.99468	0.98929	0.00539	8	0.674		0.655
	D	1.01188	1.00680	0.00508	8	0.635	CV	
	E	0.98545	0.98025	0.00520	8	0.650		6.44
CONC:	A	0.98609	0.97999	0.00610	8	0.762	AVG DRY	
	B	1.01388	1.00848	0.00540	8	0.675	WEIGHT (mg)	
32%	C	0.98120	0.97359	0.00761	8	0.951		0.742
	D	0.98219	0.97770	0.00449	8	0.561	CV	
	E	0.99892	0.99285	0.00607	8	0.759		
CONC:	A	0.99801	0.99175	0.00626	8	0.782	AVG DRY	
	B	0.98983	0.98402	0.00581	8	0.726	WEIGHT (mg)	
42%	C	1.00817	1.00317	0.00500	8	0.625		0.695
	D	1.00763	1.00245	0.00518	8	0.647	CV	
	E	0.98751	0.98197	0.00554	8	0.692		
CONC:	A	0.99869	0.99345	0.00524	8	0.655	AVG DRY	
	B	1.00897	1.00389	0.00508	8	0.635	WEIGHT (mg)	
56%	C	0.98982	0.98313	0.00669	8	0.836		0.754
	D	0.99718	0.99119	0.00599	8	0.749	CV	
	E	1.01159	1.00444	0.00715	8	0.894		
CONC:	A	1.02070	1.01521	0.00549	8	0.686	AVG DRY	
	B	1.01297	1.00662	0.00635	8	0.794	WEIGHT (mg)	
75%	C	1.01531	1.00943	0.00588	8	0.735		0.757
	D	1.03324	1.02710	0.00614	8	0.768	CV	
	E	1.01022	1.00379	0.00643	8	0.804		
CONC:	A	0.98301	0.97760	0.00541	8	0.676	AVG DRY	
	B	1.01427	1.00854	0.00573	8	0.716	WEIGHT (mg)	
100%	C	0.99531	0.98751	0.00780	8	0.975		0.837
	D	1.02557	1.01831	0.00726	8	0.908	CV	
	E	1.01646	1.00919	0.00727	8	0.909		15.8

CV = (STANDARD DEVIATION/MEAN)*100

REMARKS:

Pimephales promelas **FATHEAD MINNOW** TEST 1000.0

WEIGHT DATA FOR LARVAL SURVIVAL AND GROWTH TEST

LAB # / #s:	060485			TEST DATES (BEGIN / END):	4/20-27/04		
CLIENT:	Weston			WEIGHING DATE / TIME:	5-1-04 / 1015		
ANALYSTS:				DRYING TEMP (DEGREES C):	60°C		
SAMPLE ID:				DRYING TIME (HOURS):	24hrs		

	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	0.99714	0.99143		8		AVG DRY
control	B 2	1.02681	1.02200		7		WEIGHT (mg)
	C 3	0.99468	0.98929		7		
	D 4	1.01188	1.00680		7		CV
	E 5	0.98545	0.98025		8		
CONC:	A 6	0.98609	0.97999		8		AVG DRY
	B 7	1.01388	1.00848		7		WEIGHT (mg)
32%	C 8	0.98120	0.97359		8		
	D 9	0.98219	0.97770		7		CV
	E 10	0.99892	0.99285		8		
CONC:	A 11	0.99801	0.99175		8		AVG DRY
	B 12	0.98983	0.98402		7		WEIGHT (mg)
42%	C 13	1.00817	1.00317		6		
	D 14	1.00763	1.00245		6		CV
	E 15	0.98751	0.98197		7		
CONC:	A 16	0.99869	0.99345		8		AVG DRY
	B 17	1.00897	1.00389		7		WEIGHT (mg)
56%	C 18	0.98982	0.98313		8		
	D 19	0.99718	0.99119		8		CV
	E 20	1.01159	1.00444		8		
CONC:	A 21	1.02070	1.01521		6		AVG DRY
	B 22	1.01297	1.00662		8		WEIGHT (mg)
75%	C 23	1.01531	1.00943		8		
	D 24	1.03324	1.02710		8		CV
	E 25	1.01022	1.00379		8		
CONC:	A 26	0.98301	0.97760		8		AVG DRY
	B 27	1.01427	1.00854		7		WEIGHT (mg)
100%	C 28	0.99531	0.98751		8		
	D 29	1.02557	1.01831		7		CV
	E 30	1.01646	1.00919		8		

CV = (STANDARD DEVIATION/MEAN)*100

REMARKS:

Pimephales promelas **FATHEAD MINNOW** **TEST 1000.0**

WEIGHT DATA FOR LARVAL SURVIVAL AND GROWTH TEST

LAB # / #s:	604185				**TEST DATES (BEGIN / END):**		4/20-27/06	
CLIENT:	EEMA- Alternate Method				**WEIGHING DATE / TIME:**		5/1/06, 1020	
ANALYSTS:	jm, 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**	1.00994	1.00755	0.00239	8	0.299	**AVG DRY**	
	B	1.00599	1.00368	0.00231	8	0.289	**WEIGHT (mg)**	
	C	1.01084	1.00735	0.00349	8	0.436		0.350
	D	0.98415	0.98106	0.00309	8	0.386	**CV**	
	E	1.01173	1.00900	0.00273	8	0.341		17.6
CONC:	**A**	1.00539	1.00269	0.00270	8	0.337	**AVG DRY**	
	B	0.99348	0.99030	0.00318	8	0.398	**WEIGHT (mg)**	
32%	**C**	1.00699	1.00376	0.00323	8	0.404		0.387
	D	1.01761	1.01409	0.00352	8	0.440	**CV**	
	E	0.98677	0.98391	0.00286	8	0.358		
CONC:	**A**	0.97274	0.97063	0.00211	8	0.264	**AVG DRY**	
	B	1.01130	1.00836	0.00294	8	0.368	**WEIGHT (mg)**	
42%	**C**	0.99987	0.99668	0.00319	8	0.399		0.335
	D	0.98615	0.98453	0.00162	8	0.202	**CV**	
	E	1.00454	1.00099	0.00355	8	0.444		
CONC:	**A**	0.99298	0.98963	0.00335	8	0.419	**AVG DRY**	
	B	1.00863	1.00480	0.00383	8	0.479	**WEIGHT (mg)**	
56%	**C**	1.00032	0.99733	0.00299	8	0.374		0.426
	D	1.02413	1.02070	0.00343	8	0.429	**CV**	
	E	1.01799	1.01456	0.00343	8	0.429		
CONC:	**A**	1.02466	1.02157	0.00309	8	0.386	**AVG DRY**	
	B	1.00295	0.99921	0.00374	8	0.467	**WEIGHT (mg)**	
75%	**C**	0.99270	0.98976	0.00294	8	0.368		0.401
	D	0.98788	0.98473	0.00315	8	0.394	**CV**	
	E	0.99853	0.99541	0.00312	8	0.390		
CONC:	**A**	1.06575	1.06229	0.00346	8	0.433	**AVG DRY**	
	B	1.00362	0.99976	0.00386	8	0.482	**WEIGHT (mg)**	
100%	**C**	1.00427	1.00082	0.00345	8	0.431		0.441
	D	0.98373	0.98014	0.00359	8	0.449	**CV**	
	E	0.98833	0.98506	0.00327	8	0.409		6.20

CV = (STANDARD DEVIATION/MEAN)*100

REMARKS:

Pimephales promelas **FATHEAD MINNOW** TEST 1000.0

WEIGHT DATA FOR LARVAL SURVIVAL AND GROWTH TEST

LAB # / #s: 0604185					TEST DATES (BEGIN / END): 4/20-27/04		
CLIENT: Weston Alt					WEIGHING DATE / TIME: 5-1-04/1020		
ANALYSTS:					DRYING TEMP (DEGREES C): 40°C		
SAMPLE ID:					DRYING TIME (HOURS): 24hrs.		
	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 31	1.00994	1.00755		6		AVG DRY
	B 32	1.00599	1.00368		5		WEIGHT (mg)
control	C 33	1.01084	1.00735		7		
	D 34	0.98415	0.98106		7		CV
	E 35	1.01173	1.00900		6		
CONC:	A 36	1.00539	1.00269		7		AVG DRY
	B 37	0.99348	0.99630		8		WEIGHT (mg)
32%	C 38	1.00699	1.00376		7		
	D 39	1.01761	1.01409		8		CV
	E 40	0.98677	0.98391		7		
CONC:	A 41	0.97274	0.97063		6		AVG DRY
	B 42	1.01130	1.00836		7		WEIGHT (mg)
42%	C 43	0.99987	0.99668		8		
	D 44	0.98615	0.98453		5		CV
	E 45	1.00454	1.00099		8		
CONC:	A 46	0.99298	0.98963		6		AVG DRY
	B 47	1.00863	1.00480		8		WEIGHT (mg)
56%	C 48	1.00032	0.99733		7		
	D 49	1.02413	1.02070		7		CV
	E 50	1.01799	1.01456		7		
CONC:	A 51	1.02466	1.02157		6		AVG DRY
	B 52	1.00295	0.99921		8		WEIGHT (mg)
75%	C 53	0.99270	0.98976		8		
	D 54	0.98788	0.98473		8		CV
	E 55	0.99853	0.99541		6		
CONC:	A 56	1.06575	1.06229		8		AVG DRY
	B 57	1.00362	0.99976		8		WEIGHT (mg)
100%	C 58	1.00427	1.00082		6		
	D 59	0.98373	0.98014		7		CV
	E 60	0.98833	0.98506		7		

CV = (STANDARD DEVIATION/MEAN)*100

REMARKS:

AA # 0604185 FATHEAD SURVIVAL, CHRONIC 4-20-06
File: k604185s Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

) = 0.327

W = 0.902

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 # 0604185 FATHEAD SURVIVAL, CHRONIC 4-20-06
File: k604185s Transform: ARC SINE(SQUARE ROOT(Y))

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 2.22

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 # 0604185 FATHEAD SURVIVAL, CHRONIC 4-20-06
FILE: k604185s
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 6

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

AA # 0604185 FATHEAD SURVIVAL, CHRONIC 4-20-06
File: k604185s Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.094	0.019	1.386
Within (Error)	24	0.327	0.014	
Total	29	0.421		

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

AA # 0604185 FATHEAD SURVIVAL, CHRONIC 4-20-06
File: k604185s 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	1.283	0.925		
2	32 % EFFLUENT	1.320	0.950	-0.498	
3	42 % EFFLUENT	1.181	0.850	1.378	
4	56 % EFFLUENT	1.356	0.975	-0.996	
5	75 % EFFLUENT	1.324	0.950	-0.556	
6	100 % EFFLUENT	1.320	0.950	-0.498	

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

AA # 0604185 FATHEAD SURVIVAL, CHRONIC 4-20-06
File: k604185s 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	0.118	12.8	-0.025
3	42 % EFFLUENT	5	0.118	12.8	0.075
4	56 % EFFLUENT	5	0.118	12.8	-0.050
5	75 % EFFLUENT	5	0.118	12.8	-0.025
6	100 % EFFLUENT	5	0.118	12.8	-0.025

AA# 0604185 FATHEAD SURVIVAL, ALTERNATE CHRONIC 4-20-06
'ile: k604185s Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.583

' = 0.928

Critical W (P = 0.05) (n = 30) = 0.927
'ritical W (P = 0.01) (n = 30) = 0.900

)ata PASS normality test at P=0.01 level. Continue analysis.

AA# 0604185 FATHEAD SURVIVAL, ALTERNATE CHRONIC 4-20-06
File: k604185s Transform: ARC SINE(SQUARE ROOT(Y))

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 2.79

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# 0604185 FATHEAD SURVIVAL, ALTERNATE CHRONIC 4-20-06
FILE: k604185s
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	0.8750	1.2094
1	CONTROL	2	0.6250	0.9117
1	CONTROL	3	0.8750	1.2094
1	CONTROL	4	0.8750	1.2094
1	CONTROL	5	0.7500	1.0472
2	32 % EFFLUENT	1	0.8750	1.2094
2	32 % EFFLUENT	2	1.0000	1.3931
2	32 % EFFLUENT	3	0.8750	1.2094
2	32 % EFFLUENT	4	1.0000	1.3931
2	32 % EFFLUENT	5	0.8750	1.2094
3	42 % EFFLUENT	1	0.7500	1.0472
3	42 % EFFLUENT	2	0.8750	1.2094
3	42 % EFFLUENT	3	1.0000	1.3931
3	42 % EFFLUENT	4	0.6250	0.9117
3	42 % EFFLUENT	5	1.0000	1.3931
4	56 % EFFLUENT	1	0.7500	1.0472
4	56 % EFFLUENT	2	1.0000	1.3931
4	56 % EFFLUENT	3	0.8750	1.2094
4	56 % EFFLUENT	4	0.8750	1.2094
4	56 % EFFLUENT	5	0.8750	1.2094
5	75 % EFFLUENT	1	0.7500	1.0472
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	0.7500	1.0472
6	100 % EFFLUENT	1	1.0000	1.3931
6	100 % EFFLUENT	2	1.0000	1.3931
6	100 % EFFLUENT	3	0.7500	1.0472
6	100 % EFFLUENT	4	0.8750	1.2094
6	100 % EFFLUENT	5	0.8750	1.2094

AA# 0604185 FATHEAD SURVIVAL, ALTERNATE CHRONIC 4-20-06
File: k604185s Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.087	0.017	0.720
Within (Error)	24	0.583	0.024	
Total	29	0.670		

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

AA# 0604185 FATHEAD SURVIVAL, ALTERNATE CHRONIC 4-20-06
File: k604185s 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	1.117	0.800		
2	32 % EFFLUENT	1.283	0.925	-1.679	
3	42 % EFFLUENT	1.191	0.850	-0.745	
4	56 % EFFLUENT	1.214	0.875	-0.977	
5	75 % EFFLUENT	1.255	0.900	-1.393	
6	100 % EFFLUENT	1.250	0.900	-1.350	

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

AA# 0604185 FATHEAD SURVIVAL, ALTERNATE CHRONIC 4-20-06
File: k604185s 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	0.209	26.2	-0.125
3	42 % EFFLUENT	5	0.209	26.2	-0.050
4	56 % EFFLUENT	5	0.209	26.2	-0.075
5	75 % EFFLUENT	5	0.209	26.2	-0.100
6	100 % EFFLUENT	5	0.209	26.2	-0.100

AA # 0604185 FATHEAD GROWTH, CHRONIC, 4-20-06
File: K604185G Transform: NO TRANSFORMATION

Shapiro - Wilk's test for normality

D = 0.234

W = 0.988

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 # 0604185 FATHEAD GROWTH, CHRONIC, 4-20-06
File: K604185G Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 8.98

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 # 0604185 FATHEAD GROWTH, CHRONIC, 4-20-06
FILE: K604185G
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	0.7140	0.7140
1	CONTROL	2	0.6010	0.6010
1	CONTROL	3	0.6740	0.6740
1	CONTROL	4	0.6350	0.6350
1	CONTROL	5	0.6500	0.6500
2	32 % EFFLUENT	1	0.7620	0.7620
2	32 % EFFLUENT	2	0.6750	0.6750
2	32 % EFFLUENT	3	0.9510	0.9510
2	32 % EFFLUENT	4	0.5610	0.5610
2	32 % EFFLUENT	5	0.7590	0.7590
3	42 % EFFLUENT	1	0.7820	0.7820
3	42 % EFFLUENT	2	0.7260	0.7260
3	42 % EFFLUENT	3	0.6250	0.6250
3	42 % EFFLUENT	4	0.6470	0.6470
3	42 % EFFLUENT	5	0.6920	0.6920
4	56 % EFFLUENT	1	0.6550	0.6550
4	56 % EFFLUENT	2	0.6350	0.6350
4	56 % EFFLUENT	3	0.8360	0.8360
4	56 % EFFLUENT	4	0.7490	0.7490
4	56 % EFFLUENT	5	0.8940	0.8940
5	75 % EFFLUENT	1	0.6860	0.6860
5	75 % EFFLUENT	2	0.7940	0.7940
5	75 % EFFLUENT	3	0.7350	0.7350
5	75 % EFFLUENT	4	0.7680	0.7680
5	75 % EFFLUENT	5	0.8040	0.8040
6	100 % EFFLUENT	1	0.6760	0.6760
6	100 % EFFLUENT	2	0.7160	0.7160
6	100 % EFFLUENT	3	0.9750	0.9750
6	100 % EFFLUENT	4	0.9080	0.9080
6	100 % EFFLUENT	5	0.9090	0.9090

AA # 0604185 FATHEAD GROWTH, CHRONIC, 4-20-06
File: K604185G Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.096	0.019	1.970
Within (Error)	24	0.234	0.010	
Total	29	0.330		

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

AA # 0604185 FATHEAD GROWTH, CHRONIC, 4-20-06
File: K604185G Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	0.655	0.655		
2	32 % EFFLUENT	0.742	0.742	-1.390	
3	42 % EFFLUENT	0.694	0.694	-0.634	
4	56 % EFFLUENT	0.754	0.754	-1.586	
5	75 % EFFLUENT	0.757	0.757	-1.643	
6	100 % EFFLUENT	0.837	0.837	-2.915	

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

AA # 0604185 FATHEAD GROWTH, CHRONIC, 4-20-06
File: K604185G Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	CONTROL	5			
2	32 % EFFLUENT	5	0.147	22.5	-0.087
3	42 % EFFLUENT	5	0.147	22.5	-0.040
4	56 % EFFLUENT	5	0.147	22.5	-0.099
5	75 % EFFLUENT	5	0.147	22.5	-0.103
6	100 % EFFLUENT	5	0.147	22.5	-0.182

AA# 0604185 FATHEAD GROWTH, ALTERNATE CHRONIC, 4-20-06
File: K604185G Transform: NO TRANSFORMATION

Shapiro - Wilk's test for normality

D = 0.076

W = 0.983

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# 0604185 FATHEAD GROWTH, ALTERNATE CHRONIC, 4-20-06
File: K604185G Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 8.67

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# 0604185 FATHEAD GROWTH, ALTERNATE CHRONIC, 4-20-06
FILE: K604185G
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	0.2990	0.2990
1	CONTROL	2	0.2890	0.2890
1	CONTROL	3	0.4360	0.4360
1	CONTROL	4	0.3860	0.3860
1	CONTROL	5	0.3410	0.3410
2	32 % EFFLUENT	1	0.3370	0.3370
2	32 % EFFLUENT	2	0.3980	0.3980
2	32 % EFFLUENT	3	0.4040	0.4040
2	32 % EFFLUENT	4	0.4400	0.4400
2	32 % EFFLUENT	5	0.3580	0.3580
3	42 % EFFLUENT	1	0.2640	0.2640
3	42 % EFFLUENT	2	0.3680	0.3680
3	42 % EFFLUENT	3	0.3990	0.3990
3	42 % EFFLUENT	4	0.2020	0.2020
3	42 % EFFLUENT	5	0.4440	0.4440
4	56 % EFFLUENT	1	0.4190	0.4190
4	56 % EFFLUENT	2	0.4790	0.4790
4	56 % EFFLUENT	3	0.3740	0.3740
4	56 % EFFLUENT	4	0.4290	0.4290
4	56 % EFFLUENT	5	0.4290	0.4290
5	75 % EFFLUENT	1	0.3860	0.3860
5	75 % EFFLUENT	2	0.4670	0.4670
5	75 % EFFLUENT	3	0.3680	0.3680
5	75 % EFFLUENT	4	0.3940	0.3940
5	75 % EFFLUENT	5	0.3900	0.3900
6	100 % EFFLUENT	1	0.4330	0.4330
6	100 % EFFLUENT	2	0.4820	0.4820
6	100 % EFFLUENT	3	0.4310	0.4310
6	100 % EFFLUENT	4	0.4490	0.4490
6	100 % EFFLUENT	5	0.4090	0.4090

AA# 0604185 FATHEAD GROWTH, ALTERNATE CHRONIC, 4-20-06
File: K604185G Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.043	0.009	2.713
Within (Error)	24	0.076	0.003	
Total	29	0.119		

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

AA# 0604185 FATHEAD GROWTH, ALTERNATE CHRONIC, 4-20-06
File: K604185G Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	0.350	0.350		
2	32 % EFFLUENT	0.387	0.387	-1.047	
3	42 % EFFLUENT	0.335	0.335	0.416	
4	56 % EFFLUENT	0.426	0.426	-2.133	
5	75 % EFFLUENT	0.401	0.401	-1.429	
6	100 % EFFLUENT	0.441	0.441	-2.549	

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

AA# 0604185 FATHEAD GROWTH, ALTERNATE CHRONIC, 4-20-06
File: K604185G Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	CONTROL	5			
2	32 % EFFLUENT	5	0.084	24.0	-0.037
3	42 % EFFLUENT	5	0.084	24.0	0.015
4	56 % EFFLUENT	5	0.084	24.0	-0.076
5	75 % EFFLUENT	5	0.084	24.0	-0.051
6	100 % EFFLUENT	5	0.084	24.0	-0.091

APPENDIX D

Ceriodaphnia dubia Raw Data and Statistics

Ceriodaphnia dubia — **SURVIVAL AND REPRODUCTION TEST**

Discharger: Weston | Lab Number/s: 0604185 | Analyst: KP, TT

Location: | Test Start-Date/Time: 4/20/04 : 1030

Date Sample Collected: ? | Test Stop-Date/Time: 4-26-04 / 0900

Conc 1 (Control)

%	Day	A	B	C	D	E	F	G	H	I	J	No. of Young	No. of Adults	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	X	0	9	0	TT
	3	4	5	4	9	9	4	5	6	8	–	56	9	6.2	KP
	4	0	6	0	0	0	1	0	0	0	–	7	9	0.8	KP
	5	7	6	12	12	11	9	8	7	10	–	82	9	9.1	KP
	6	9	0	11	17	7	15	11	15	18	–	103	9	11.4	KP
	7														
	8												80% 3rd brood		
	Total	22	17	27	38	27	29	24	28	36	X0	248	$\bar{X}$=27.6	CV=23.6%	

Conc 2 (32)

%	Day	A	B	C	D	E	F	G	H	I	J	No. of Young	No. of Adults	Young/ Adult	Analyst
	1	0	0	0	0	0	0	0	0	0	0	0			KP
	2	0	0	0	0	0	0	0	0	0	0	0			TT
	3	8	5	4	5	0	7	7	5	4	5	50			KP
	4	9	0	8	7	7	6	0	0	8	9	48			KP
	5	10	11	11	16	14	13	9	7	11	10	114			KP
	6	2	14	2	6	3	15	10	11	0	1	58			KP
	7														
	8														
	Total	29	30	25	28	26	35	26	23	23	25	270			

Conc 3 (42)

%	Day	A	B	C	D	E	F	G	H	I	J	No. of Young	No. of Adults	Young/ Adult	Analyst
	1	0	0	0	0	0	0	0	0	0	0	0			KP
	2	0	0	0	0	0	0	0	0	0	0	0			TT
	3	0	1	0	0	7	6	8	0	10	4	52			KP
	4	8	4	10	6	0	9	0	4	4	10	55			KP
	5	11	0	8	12	13	13	9	10	5	8	89			KP
	6	3	3	0	10	6	0	7	9	12	0	50			KP
	7														
	8														
	Total	22	8	18	34	26	28	24	23	31	22	246			

Conc 4 (56)

%	Day	A	B	C	D	E	F	G	H	I	J	No. of Young	No. of Adults	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	TT
	3	4	7	9	6	3	8	4	4	10	3	58	10	5.8	KP
	4	10	0	0	0	0	0	10	11	0	8	39	10	3.9	KP
	5	18	12	10	11	8	14	10	15	12	17	127	10	12.7	KP
	6	0	13	14	10	17	12	0	0	7	0	73	10	7.3	KP
	7														
	8														
	Total	32	32	33	27	28	34	24	30	29	28	297			

Conc 5 (75)

%	Day	A	B	C	D	E	F	G	H	I	J	No. of Young	No. of Adults	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	TT
	3	6	4	4	6	0	4	5	6	5	4	44	10	4.4	KP
	4	7	8	0	0	7	4	0	0	8	4	38	10	3.8	KP
	5	13	10	11	16	15	11	13	11	1	11	112	10	11.2	KP
	6	1	0	14	13	1	14	16	17	17	14	107	10	10.7	KP
	7														
	8														
	Total	27	22	29	35	23	33	34	34	31	33	301			

Conc 6 (100)

%	Day	A	B	C	D	E	F	G	H	I	J	No. of Young	No. of Adults	Young/ Adult	Analyst
	1	0	0	0	0	0	0	0	0	0	0	0			KP
	2	0	0	0	0	0	0	0	0	0	0	0			TT
	3	5	5	0	5	3	7	4	0	4	0	33			KP
	4	12	0	9	7	10	0	0	11	8	9	66			KP
	5	15	10	11	11	11	10	8	1	0	14	91			KP
	6	2	14	13	0	16	13	13	14	13	17	115			KP
	7														
	8														
	Total	34	29	33	23	40	30	25	26	25	40	305	$\bar{X}$=30.5		

CV=20.1%

X=DEAD; Y=MALE

FISHER'S EXACT TEST

IDENTIFICATION	NUMBER OF DEAD	NUMBER OF ALIVE	TOTAL ANIMALS
CONTROL	1	9	10
32% EFFLUENT	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% EFFLUENT	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% EFFLUENT	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

	NUMBER OF		
IDENTIFICATION	DEAD	ALIVE	TOTAL ANIMALS
CONTROL	1	9	10
75% EFFLUENT	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

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

2	42%	EFFLUENT	10	0
3	56%	EFFLUENT	10	0
4	75%	EFFLUENT	10	0
5	100%	EFFLUENT	10	0

AA # 0604185, CERIODAPHNIA DUBIA REPRODUCTION, 4-20-06
File: K604185C 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 # 0604185, CERIODAPHNIA DUBIA REPRODUCTION, 4-20-06
File: K604185C Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 17.93

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 # 0604185, CERIODAPHNIA DUBIA REPRODUCTION, 4-20-06
FILE: K604185C
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	22.0000	22.0000
1	CONTROL	2	17.0000	17.0000
1	CONTROL	3	27.0000	27.0000
1	CONTROL	4	38.0000	38.0000
1	CONTROL	5	27.0000	27.0000
1	CONTROL	6	29.0000	29.0000
1	CONTROL	7	24.0000	24.0000
1	CONTROL	8	28.0000	28.0000
1	CONTROL	9	36.0000	36.0000
1	CONTROL	10	0.0000	0.0000
2	32 % EFFLUENT	1	29.0000	29.0000
2	32 % EFFLUENT	2	30.0000	30.0000
2	32 % EFFLUENT	3	25.0000	25.0000
2	32 % EFFLUENT	4	28.0000	28.0000
2	32 % EFFLUENT	5	26.0000	26.0000
2	32 % EFFLUENT	6	35.0000	35.0000
2	32 % EFFLUENT	7	26.0000	26.0000
2	32 % EFFLUENT	8	23.0000	23.0000
2	32 % EFFLUENT	9	23.0000	23.0000
2	32 % EFFLUENT	10	25.0000	25.0000
3	42 % EFFLUENT	1	22.0000	22.0000
3	42 % EFFLUENT	2	8.0000	8.0000
3	42 % EFFLUENT	3	18.0000	18.0000
3	42 % EFFLUENT	4	34.0000	34.0000
3	42 % EFFLUENT	5	26.0000	26.0000
3	42 % EFFLUENT	6	28.0000	28.0000
3	42 % EFFLUENT	7	24.0000	24.0000
3	42 % EFFLUENT	8	23.0000	23.0000
3	42 % EFFLUENT	9	31.0000	31.0000
3	42 % EFFLUENT	10	22.0000	22.0000
4	56 % EFFLUENT	1	32.0000	32.0000
4	56 % EFFLUENT	2	32.0000	32.0000
4	56 % EFFLUENT	3	33.0000	33.0000
4	56 % EFFLUENT	4	27.0000	27.0000
4	56 % EFFLUENT	5	28.0000	28.0000
4	56 % EFFLUENT	6	34.0000	34.0000
4	56 % EFFLUENT	7	24.0000	24.0000
4	56 % EFFLUENT	8	30.0000	30.0000
4	56 % EFFLUENT	9	29.0000	29.0000
4	56 % EFFLUENT	10	28.0000	28.0000
5	75 % EFFLUENT	1	27.0000	27.0000
5	75 % EFFLUENT	2	22.0000	22.0000
5	75 % EFFLUENT	3	29.0000	29.0000
5	75 % EFFLUENT	4	35.0000	35.0000
5	75 % EFFLUENT	5	23.0000	23.0000
5	75 % EFFLUENT	6	33.0000	33.0000
5	75 % EFFLUENT	7	34.0000	34.0000
5	75 % EFFLUENT	8	34.0000	34.0000
5	75 % EFFLUENT	9	31.0000	31.0000

5	75	%	EFFLUENT	10	33.0000	33.0000
6	100	%	EFFLUENT	1	34.0000	34.0000
6	100	%	EFFLUENT	2	29.0000	29.0000
6	100	%	EFFLUENT	3	33.0000	33.0000
6	100	%	EFFLUENT	4	23.0000	23.0000
6	100	%	EFFLUENT	5	40.0000	40.0000
6	100	%	EFFLUENT	6	30.0000	30.0000
6	100	%	EFFLUENT	7	25.0000	25.0000
6	100	%	EFFLUENT	8	26.0000	26.0000
6	100	%	EFFLUENT	9	25.0000	25.0000
6	100	%	EFFLUENT	10	40.0000	40.0000

AA # 0604185, CERIODAPHNIA DUBIA REPRODUCTION, 4-20-06
File: K604185C Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	24.800				
2	32 % EFFLUENT	27.000	107.00	75.00	10.00	
3	42 % EFFLUENT	23.600	96.00	75.00	10.00	
4	56 % EFFLUENT	29.700	124.00	75.00	10.00	
5	75 % EFFLUENT	30.100	121.00	75.00	10.00	
6	100 % EFFLUENT	30.500	121.50	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 4-20-06 Arkansas Analytical

SPECIES Pimephales promelas

QUANTITY SHIPPED 700+

AGE/LIFE STAGE 24 hrs 4/20 1500+

BROODSTOCK SOURCE Anderson-Tams, AR

CULTURE WATER groundwater

ALKALINITY (Mg/l as $CaCO_3$) =180

HARDNESS (Mg/l as $CaCO_3$)/Salinity (ppt) =160

FEEDING Artemia

COMMENTS

PACKAGED BY MW

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: 4/11/06

SPECIES: Ceriodaphnia dubia

AGE: Variable

LIFE STAGE: Adult

HATCH DATE: Variable

BEGAN FEEDING: Immediately

FOOD: YTC, Selenastrum

Water Chemistry Record:	Current	Range
TEMPERATURE:	23°C	22-25°C
SALINITY/CONDUCTIVITY:	--	--
TOTAL HARDNESS (as $CaCO_3$):	124 mg/l	60-138 mg/l
TOTAL ALKALINITY (as $CaCO_3$):	100 mg/l	50-110 mg/l
pH:	7.95	7.10-8.32

Comments:

Facility Supervisor

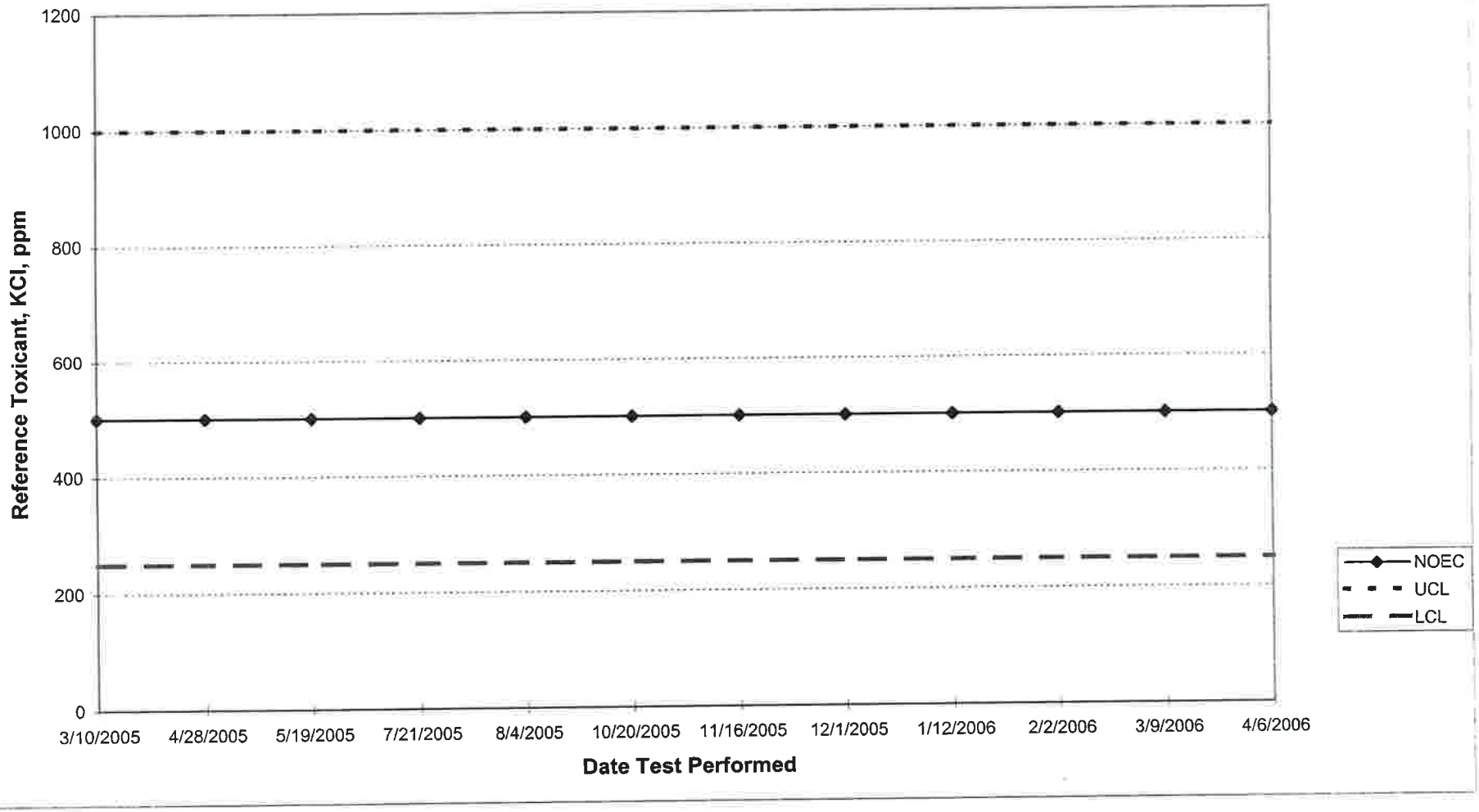
APPENDIX F

Quality Assurance Charts

ARKANSAS ANALYTICAL, INC.

FATHEAD MINNOW SURVIVAL

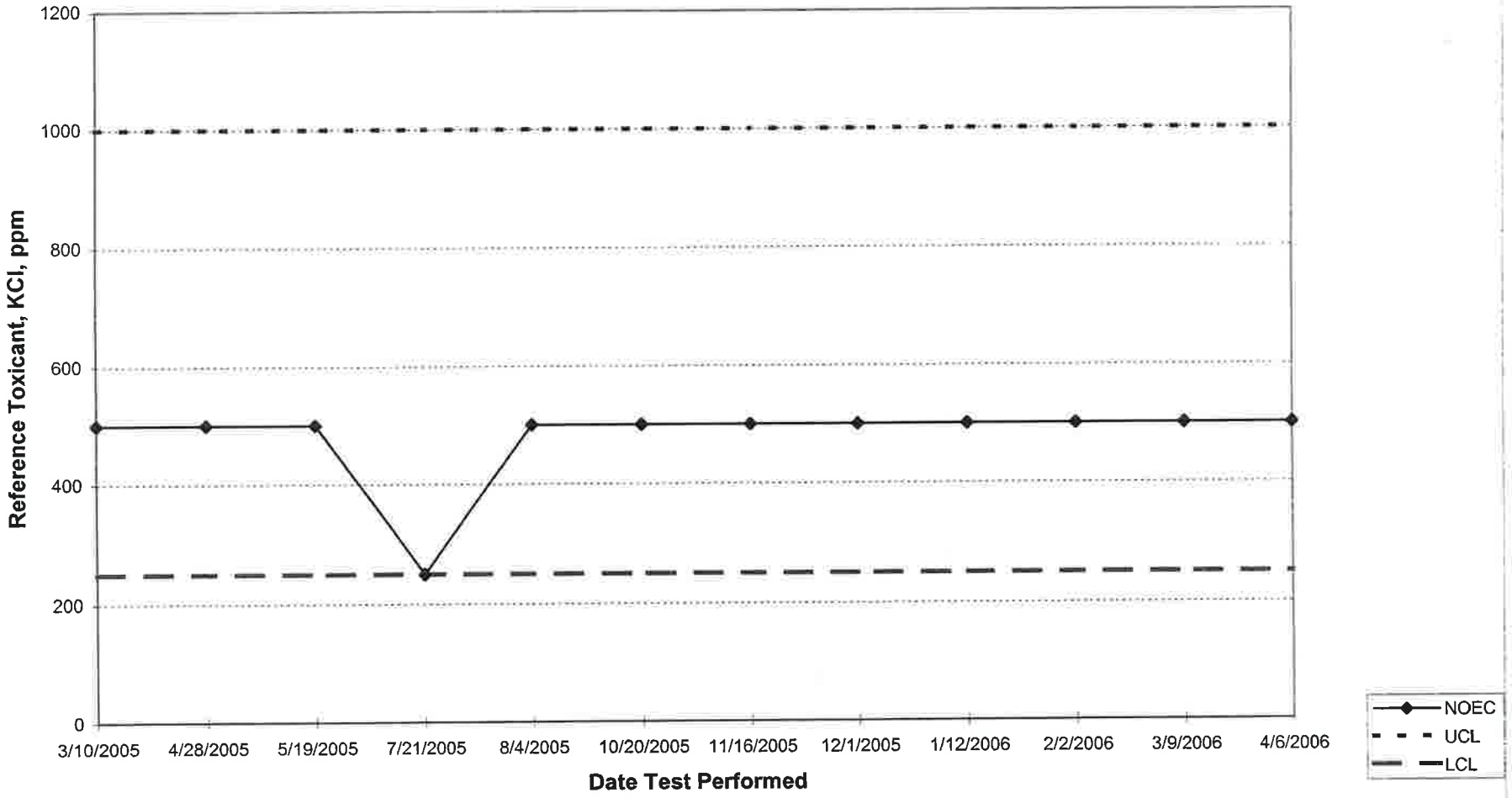
QUALITY ASSURANCE



ARKANSAS ANALYTICAL, INC.

FATHEAD MINNOW GROWTH

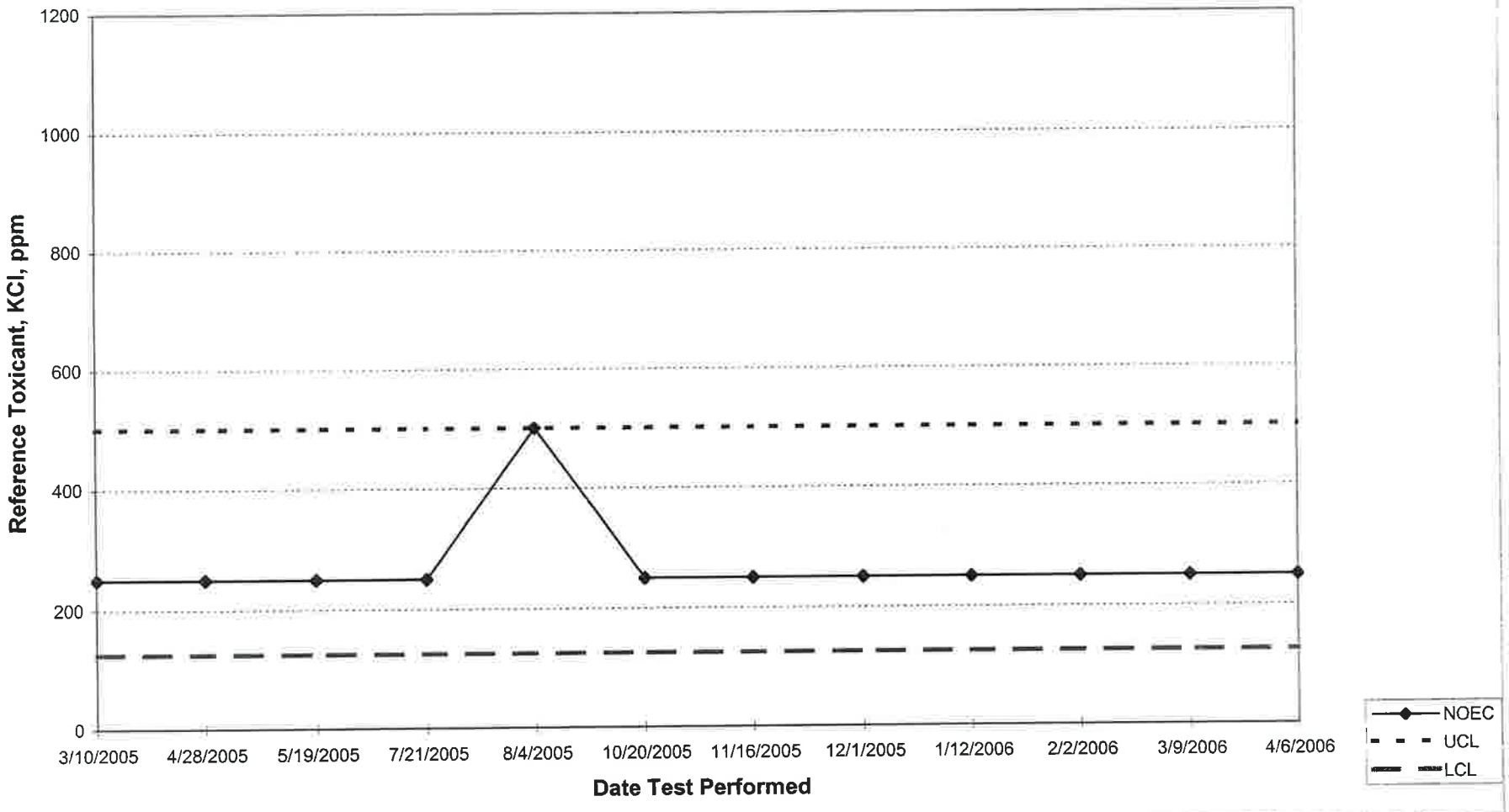
QUALITY ASSURANCE



ARKANSAS ANALYTICAL, INC.

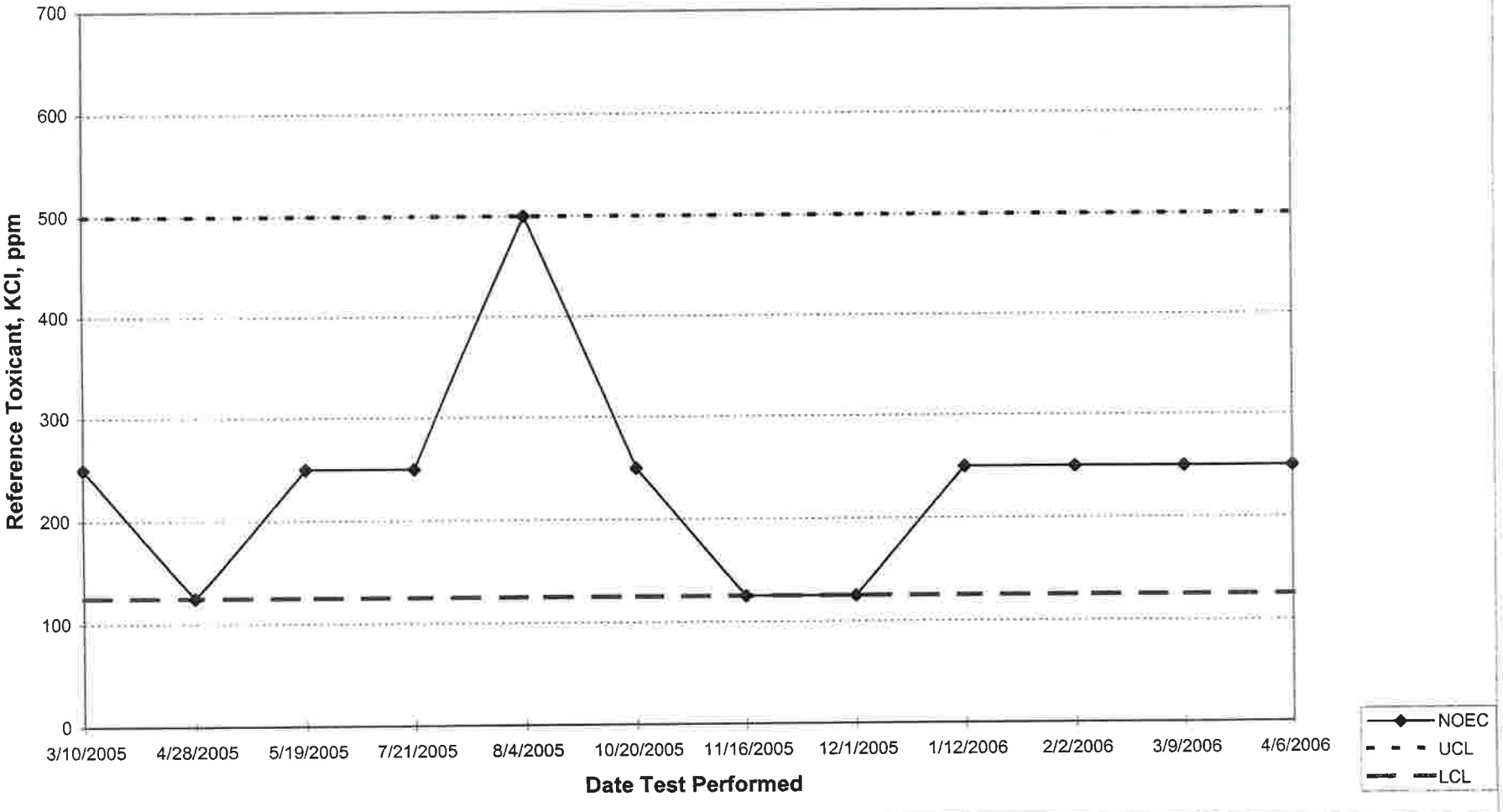
CERIODAPHNIA DUBIA SURVIVAL

QUALITY ASSURANCE



ARKANSAS ANALYTICAL, INC.

CERIODAPHNIA DUBIA REPRODUCTION
QUALITY ASSURANCE



APPENDIX G

Lab Certification

State of Arkansas
Department of Environmental Quality
Laboratory Certification Program

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: **05-070-0**

Issued Date: **30 October 2005**

Expired Date: **30 October 2006**

J A Semberski

ADEQ Quality Assurance Officer

Date October 28, 2005