Arkansas Analytical, Inc.

Toxicity Test Results

MAGCOBAR MINE SITE
NPDES PERMIT NUMBER: AR0049794
October 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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Monday, November 07, 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 October 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:	10-10-05, 0930	10-11-05, 0930
Sample #2:	10-11-05, 0930	10-12-05, 0930
Sample #3:	10-17-05, 0930	10-18-05, 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:	10-11-05, 1105	4
Sample #2:	10-12-05, 1056	4
Sample #3:	10-18-05, 1030	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 Aquatic Biosystems; 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	30.8	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	27.5%	X	

TEST ACCEPTANCE CRITERIA for *Pimephales promelas*

Control Criteria	Results	Pass	Fail
Greater than or equal to 80% survival	88%	X	
The percent coefficient of variation between replicates must be 40% or less for survival	9.50%	X	
Minimum of 0.25 mg average dry weight of surviving controls	0.441	X	
The percent coefficient of variation between replicates must be 40% or less for growth	11.7%	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)	31.0	%CV survival (critical dilution)	7.86%
%CV Reproduction (critical dilution)	23.9%	Mean dry weight (critical dilution) in milligrams	0.411
		%CV growth (critical dilution)	25.2%

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:

Jessica Gallagher

Teresa Thomas

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Tracy Bounds

Holly Harnish

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:	10-10-05, 0930	10-11-05, 0930
Sample #2:	10-11-05, 0930	10-12-05, 0930
Sample #3:	10-17-05, 0930	10-18-05, 0930

Test initiated (date, time): 10-13-05, 1000 Test terminated (date, time): 10-20-05, 1400

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	80	80	90	90		100	100	88	9.51
32%	90	100	90	90	90		100	100	92	
42%	90	100	90	100	100		96	96	96	
56%	100	100	100	100	90		98	98	98	
75%	100	90	80	100	90		100	100	92	
100%	90	90	90	80	100		98	98	90	7.86

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%	0.526	0.407	0.394	0.446	0.431		0.441	11.7
32%	0.417	0.403	0.291	0.306	0.368		0.357	
42%	0.372	0.356	0.326	0.348	0.313		0.343	
56%	0.353	0.384	0.244	0.386	0.525		0.378	
75%	0.408	0.428	0.364	0.396	0.396		0.398	
100%	0.312	0.475	0.337	0.372	0.559		0.411	25.2

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)= _____**9.50**_____%

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:	10-10-05, 0930	10-11-05, 0930
Sample #2:	10-11-05, 0930	10-12-05, 0930
Sample #3:	10-17-05, 0930	10-18-05, 0930

Test initiated (date, time): 10-13-05, 0900 Test terminated (date, time): 10-20-05, 0830

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	18	24	0	28	24	35
B	X0	38	41	37	45	14
C	17	X0	33	36	33	X0
D	28	34	41	39	X0	34
E	29	30	36	33	1	X0
F	39	40	0	34	33	39
G	38	36	42	34	35	33
H	35	30	30	31	34	30
I	35	46	34	39	41	32
J	38	43	36	45	35	31
Mean	27.7	32.1	29.3	35.6	27.8	24.8
Mean/surviving female	30.8	35.7	29.3	35.6	31.2	31.0
CV%*	27.5					23.9

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	90	90	100	100	100	90
48 HOURS	90	90	100	100	90	80
Test termination	90	90	100	100	90	80

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)= _____**27.5**_____%

APPENDIX A

Chain of Custody Forms

CHAIN OF CUSTODY RECORD

CLIENT INFORMATION	Project Description	Turnaround Time
EEMA O&M	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: P

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): Darrel Scott

Samplers:(Printed): Darrel Scott

Field Number	Sample Collection Date/s	Sample Collection Time/s	Grab	Comp	# of Containers	Sample Matrix	SAMPLE IDENTIFICATION/ DESCRIPTION	TEST PARAMETERS: Chronic Bio	Bottle type code G=glass,P=HDPE V=septum;A=amber	Arkansas Analytical Lab #
FD1011COMP	10/11/2005	9:30		X	4		Facilty Discharge	X		K510350A

1.Relinquished by:(Signature)	Date/Time	1.Received by:(Signature)
Darrel Scott	10/11/05 10:30	
2.Relinquished by:(Signature)	Date/Time	2.Received by laboratory (Signature)
	10-11-05 1105	

For completion by laboratory

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

REMARKS

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: 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): Darrel Scott

Samplers:(Printed): Darrel Scott

Field Number	Sample Collection Date/s	Sample Collection Time/s	Grab	Comp	# of Containers	Sample Matrix	SAMPLE IDENTIFICATION/ DESCRIPTION	TEST PARAMETERS: Chronic Bio	Arkansas Analytical Lab #
FD1012Comp	10/12/2005	9:30		X	4		Facilty Discharge	X	K510350B

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

1.Relinquished by:(Signature)	Date/Time	1.Received by:(Signature)
Darrel Scott	10/12/05 1056	
2.Relinquished by:(Signature)	Date/Time	2.Received by laboratory :(Signature)
	10/12/05 1056	

For completion by laboratory

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

Per 1°C

REMARKS

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	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): Darrel Scott

Samplers:(Printed): Darrel Scott

Field Number	Sample Collection Date/s	Sample Collection 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			
FD1018COMP	10/18/2005	9:30		X	4		Facilty Discharge	X			K50350C

1.Relinquished by:(Signature)	Date/Time	1.Received by:(Signature)
Darrel Scott	10/18/05 1030	
2.Relinquished by:(Signature)	Date/Time	2.Received by laboratory :(Signature)
	10-18-05 1030	Sydney James

For completion by laboratory

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

REMARKS

Temp. on Receipt - 1°C

APPENDIX B

Effluent and Dilution Water Data

CHEMICAL DATA SHEET FOR CHRONIC TOXICITY TESTING — Fathead Minnow

Lab # / Sample ID: K5103501 — Test Start (Date/Time): 10/13/05; 1000

Client: Weston — Test End (Date/Time): 10/20/05; 1400

		Day of Test 1	2	3	4	5	6	7	notes/remarks
Control		10/13	10/14	10/15	10/16	10/17	10/18	10/19	SS130
D.O (mg/L)	INITIAL	7.1	7.9	8.4	7.4	8.8	8.1	8.6	
	FINAL	7.3	7.8	7.4	8.0	7.4	7.6	7.7	
pH(mg/L)	INITIAL	7.7	7.6	7.5	7.8	7.2	7.6	7.7	
	FINAL	7.8	7.6	7.7	6.6	7.1	7.1	7.3	
temp(C)	INITIAL	22.9	23.1	20.5	20.9	25.1	22.2	22.4	
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
ALKALINITY(mg/L)		27	—					→	
HARDNESS(mg/L)		35	—					→	
CONDUCTIVITY(umhos/cm)		150	—					→	
CHLORINE(mg/L)		<0.05	—					→	
CONC:		32%	32%	32%	32%	32%	32%	32%	
D.O (mg/L)	INITIAL	7.3	7.9	8.7	7.5	9.0	9.0	8.9	
	FINAL	7.3	7.7	7.4	8.0	7.4	7.6	7.5	
pH(mg/L)	INITIAL	7.4	7.6	7.3	7.7	7.3	7.5	7.6	
	FINAL	7.7	7.5	7.4	7.1	7.2	7.3	7.4	
temp(C)	INITIAL	22.9	23.1	21.6	22.1	25.1	22.2	22.8	
	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	7.4	7.8	8.8	7.5	9.3	9.4	9.1	
	FINAL	7.3	7.4	7.5	8.0	7.2	7.6	7.5	
pH(mg/L)	INITIAL	7.4	7.5	7.3	7.5	7.3	7.5	7.6	
	FINAL	7.7	7.5	7.4	7.1	7.2	7.3	7.4	
temp(C)	INITIAL	22.9	23.1	21.9	22.1	25.1	22.2	22.8	
	FINAL	25.0	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	7.5	7.8	8.9	7.6	9.3	9.5	9.2	
	FINAL	7.2	7.6	7.6	7.8	7.2	7.6	7.5	
pH(mg/L)	INITIAL	7.4	7.5	7.3	7.5	7.4	7.6	7.5	
	FINAL	7.6	7.5	7.4	7.1	7.1	7.2	7.3	
temp(C)	INITIAL	22.9	23.1	22.4	22.1	25.1	22.2	22.8	
	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	7.6	7.9	9.1	7.6	9.3	9.5	9.2	
	FINAL	7.2	7.6	7.6	7.8	7.1	7.6	7.5	
pH(mg/L)	INITIAL	7.4	7.5	7.3	7.4	7.3	7.6	7.5	
	FINAL	7.6	7.4	7.4	7.1	7.1	7.2	7.3	
temp(C)	INITIAL	22.9	23.1	23.4	22.1	25.1	22.2	22.8	
	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	7.7	8.0	9.3	7.8	9.7	9.8	9.5	
	FINAL	7.2	7.7	7.6	7.8	7.1	7.4	7.5	
pH(mg/L)	INITIAL	7.4	7.5	7.3	7.3	7.3	7.5	7.5	
	FINAL	7.5	7.4	7.3	7.1	7.1	7.1	7.0	
temp(C)	INITIAL	22.9	23.1	24.2	22.1	25.1	22.2	22.8	
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
CONC: 100%		B	A	A	B	B A	C	C	
ALKALINITY((mg/L)		17	60	→	17	60	20	→	
HARDNESS(mg/L)		1400	11080	→	1400	11080	1470	→	
CONDUCTIVITY(umhos/cm)		2370	2390	→	2370	2390	2420	→	
CHLORINE(mg/L)		<0.05	<0.05	→	<0.05	<0.05	<0.05	→	

CHEMICAL DATA SHEET FOR CHRONIC TOXICITY TESTING — Ceriodaphnia dubia

Lab # / Sample ID: KSL0350 — Test Start (Date/Time): 10/13/05; 0900

Client: Weston — Test End (Date/Time): 10/20/05; 0830

		Day of Test								
		1	2	3	4	5	6	7	8	notes/remarks
Control		10/13	10/14	10/15	10/16	10/17	10/18	10/19		55130
D.O (mg/L)	INITIAL	7.11	7.9	8.4	7.4	8.8	8.7	8.6		
	FINAL	7.0	8.0	7.5	7.3	7.6	7.5	7.9		
pH	INITIAL	7.7	7.6	7.5	7.8	7.7	7.6	7.7		
	FINAL	7.8	7.5	7.2	7.5	7.4	7.5	7.4		
temp(C)	INITIAL	22.9	23.1	20.5	20.9	25.1	22.2	21.9		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0		
ALKALINITY(mg/L)		27	—	—	—	—	—	→		
HARDNESS(mg/L)		35	—	—	—	—	—	→		
CONDUCTIVITY(umhos/cm)		150	—	—	—	—	—	→		
CHLORINE(mg/L)		<0.05	—	—	—	—	—	→		
CONC:		32/1.	32/1.	32/1.	32/1.	32/1.	32/1.	32/1.		
D.O (mg/L)	INITIAL	7.3	7.9	8.7	7.5	8.9.0	9.0	8.9		
	FINAL	7.0	8.1	7.7	7.5	7.9	7.8	8.0		
pH	INITIAL	7.7	7.6	7.3	7.7	7.3	7.5	7.6		
	FINAL	7.7	7.4	7.2	7.5	7.4	7.3	7.4		
temp(C)	INITIAL	22.9	23.1	21.6	22.1	25.1	22.2	22.8		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0		
CONC:		42/1.	42/1.	42/1.	42/1.	42/1.	42/1.	42/1.		
D.O (mg/L)	INITIAL	7.4	7.8	8.8	7.5	9.3	9.4	9.1		
	FINAL	7.0	8.0	7.7	7.6	7.9	7.8	8.1		
pH	INITIAL	7.4	7.5	7.3	7.5	7.3	7.5	7.6		
	FINAL	7.7	7.4	7.4	7.5	7.5	7.4	7.4		
temp(C)	INITIAL	22.9	23.1	21.9	22.1	25.1	22.2	22.8		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0		
CONC:		56/1.	56/1.	56/1.	56/1.	56/1.	56/1.	56/1.		
D.O (mg/L)	INITIAL	7.5	7.8	8.9	7.6	9.3	9.5	9.2		
	FINAL	7.1	8.2	7.7	8.0	7.9	7.8	8.1		
pH	INITIAL	7.4	7.5	7.3	7.5	7.4	7.6	7.5		
	FINAL	7.6	7.4	7.4	7.5	7.5	7.4	7.4		
temp(C)	INITIAL	22.9	23.1	22.4	22.1	25.1	22.2	22.8		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0		
CONC:		75/1.	75/1.	75/1.	75/1.	75/1.	75/1.	75/1.		
D.O (mg/L)	INITIAL	7.6	7.9	9.1	7.6	9.3	9.5	9.2		
	FINAL	7.1	8.0	7.8	7.9	8.0	8.0	8.2		
pH	INITIAL	7.4	7.5	7.3	7.4	7.3	7.6	7.5		
	FINAL	7.6	7.4	7.4	7.4	7.6	7.7	7.5		
temp(C)	INITIAL	22.9	23.1	23.4	22.1	25.1	22.2	22.8		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0		
CONC:		100/1.	100/1.	100/1.	100/1.	100/1.	100/1.	100/1.		
D.O (mg/L)	INITIAL	7.1	8.0	9.3	7.8	9.7	9.8	9.5		
	FINAL	7.9	8.1	7.9	8.0	8.1	8.2	8.2		
pH	INITIAL	7.4	7.5	7.3	7.3	7.3	7.5	7.5		
	FINAL	7.4	7.4	7.3	7.3	7.5	7.6	7.6		
temp(C)	INITIAL	22.9	23.1	24.2	22.1	25.1	22.2	22.8		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0	25.0		
CONC:	**100%**	B	A	A	B	A	C	C		
ALKALINITY((mg/L)		17	6	→	17	6	20	→		
HARDNESS(mg/L)		1400	1680	→	1400	1680	1470	→		
CONDUCTIVITY(umhos/cm)		2370	2390	→	2370	2390	2420	→		
CHLORINE(mg/L)		<0.05	<0.05	→	<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 KS10350 TEST START DATE 10-13 TIME 1000

CLIENT Weston TEST END DATE 10-20 TIME 1400

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 31	10	10	10	10	10	10	10	10	100	88%	9.5%
	B 32		10	10	10	10	10	10	8	80		
	C 33		10	10	10	9	9	9	8	80		
	D 34		10	10	10	10	10	10	9	90		
	E 35		10	10	10	10	10	10	9	90		
CONC: 32%	A 36	10	10	10	10	10	10	9	9	90	92%	
	B 37		10	10	10	10	10	10	10	100		
	C 38		10	10	10	8 9	9	9	9	90		
	D 39		10	10	10	9	9	9	9	90		
	E 40		10	10	10	10	10	10	9	90		
CONC: 42%	A 41	10	9	9	9	9	9	9	9	90	96%	
	B 42		10	10	10	10	10	10	10	100		
	C 43		8 9	9	9	9	9	9	9	90		
	D 44		10	10	10	10	10	10	10	100		
	E 45		10	10	10	10	10	10	10	100		
CONC: 56%	A 46	10	10	10	10	10	10	10	10	100	98%	
	B 47		10	10	10	10	10	10	10	100		
	C 48		10	10	10	10	10	10	10	100		
	D 49		10	10	10	10	10	10	10	100		
	E 50		9	9	9	9	9	9	9	90		
CONC: 75%	A 51	10	10	10	10	10	10	10	10	100	92%	
	B 52		10	10	10	10	10	10	9	90		
	C 53		10	10	8 10	10	10	10	8	80		
	D 54		10	10	10	10	10	10	8 10	100		
	E 55		10	10	10	10	10	10	9	90		
CONC: 100%	A 56	10	10	10	10	10	10	10	9	90	90%	7.8%
	B 57		10	10	10	10	10	10	9	90		
	C 58		10	10	10	10	10	10	9	90		
	D 59		9	9	9	9	9	9	8	80		
	E 60		10	10	10	10	10	10	9 10	100		
ANALYST:		JG	JM	tb	JG	JG	JG	JG	HH			
DATE:		10-13	10-14	10-15	10-16	10-17	10-18	10-19	10-20			
TIME:		1000	1225	1510	1035	1305	1010	0940	1400			

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:	K510350				TEST DATES (BEGIN / END):		10/13-20/05	
CLIENT:	Weston				WEIGHING DATE / TIME:		10/24/05, 0930	
ANALYSTS:	jg				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	1.24122	1.23596	0.00526	10	0.526	AVG DRY	
	B	1.24841	1.24434	0.00407	10	0.407	WEIGHT (mg)	
	C	1.24709	1.24315	0.00394	10	0.394		0.441
	D	1.24733	1.24287	0.00446	10	0.446	CV	
	E	1.24979	1.24548	0.00431	10	0.431		11.7
CONC:	A	1.24276	1.23859	0.00417	10	0.417	AVG DRY	
	B	1.24698	1.24295	0.00403	10	0.403	WEIGHT (mg)	
32%	C	1.24992	1.24701	0.00291	10	0.291		0.357
	D	1.24866	1.24560	0.00306	10	0.306	CV	
	E	1.25079	1.24711	0.00368	10	0.368		
CONC:	A	1.23905	1.23533	0.00372	10	0.372	AVG DRY	
	B	1.23442	1.23086	0.00356	10	0.356	WEIGHT (mg)	
42%	C	1.24834	1.24508	0.00326	10	0.326		0.343
	D	1.23748	1.23400	0.00348	10	0.348	CV	
	E	1.25053	1.24740	0.00313	10	0.313		
CONC:	A	1.25233	1.24880	0.00353	10	0.353	AVG DRY	
	B	1.25349	1.24965	0.00384	10	0.384	WEIGHT (mg)	
56%	C	1.24789	1.24545	0.00244	10	0.244		0.378
	D	1.24884	1.24498	0.00386	10	0.386	CV	
	E	1.24182	1.23657	0.00525	10	0.525		
CONC:	A	1.24041	1.23633	0.00408	10	0.408	AVG DRY	
	B	1.24620	1.24192	0.00428	10	0.428	WEIGHT (mg)	
75%	C	1.24726	1.24362	0.00364	10	0.364		0.398
	D	1.23227	1.22831	0.00396	10	0.396	CV	
	E	1.23335	1.22939	0.00396	10	0.396		
CONC:	A	1.23629	1.23317	0.00312	10	0.312	AVG DRY	
	B	1.23886	1.23411	0.00475	10	0.475	WEIGHT (mg)	
100%	C	1.24413	1.24076	0.00337	10	0.337		0.411
	D	1.23389	1.23017	0.00372	10	0.372	CV	
	E	1.24510	1.23951	0.00559	10	0.559		25.2

CV = (STANDARD DEVIATION/MEAN)*100

REMARKS:

Pimephales promelas **FATHEAD MINNOW** TEST 1000.0

WEIGHT DATA FOR LARVAL SURVIVAL AND GROWTH TEST

LAB # / #s: K510350
CLIENT: Weston
ANALYSTS: JG
SAMPLE ID:

TEST DATES (BEGIN / END): 10/13/05 - 10/20/05
WEIGHING DATE / TIME: 10/24/05; 0930
DRYING TEMP (DEGREES C): 60
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	1.24122	1.23596				AVG DRY
	B 2	1.24841	1.24434				WEIGHT (mg)
Control	C 3	1.24709	1.24315				
	D 4	1.24733	1.24287				CV
	E 5	1.24979	1.24548				
CONC:	A 6	1.24276	1.23859				AVG DRY
	B 7	1.24698	1.24295				WEIGHT (mg)
32%	C 8	1.24992	1.24701				
	D 9	1.24866	1.24560				CV
	E 10	1.25079	1.24711				
CONC:	A 11	1.23905	1.23533				AVG DRY
	B 12	1.23442	1.23086				WEIGHT (mg)
42%	C 13	1.24834	1.24508				
	D 14	1.23748	1.23400				CV
	E 15	1.25053	1.24740				
CONC:	A 16	1.25233	1.24880				AVG DRY
	B 17	1.25349	1.24965				WEIGHT (mg)
56%	C 18	1.24789	1.24545				
	D 19	1.24884	1.24498				CV
	E 20	1.24182	1.23657				
CONC:	A 21	1.24041	1.23633				AVG DRY
	B 22	1.24620	1.24192				WEIGHT (mg)
75%	C 23	1.24726	1.24362				
	D 24	1.23227	1.22831				CV
	E 25	1.23335	1.22939				
CONC:	A 26	1.23629	1.23317				AVG DRY
	B 27	1.23886	1.23411				WEIGHT (mg)
100%	C 28	1.24413	1.24076				
	D 29	1.23389	1.23017				CV
	E 30	1.24510	1.23951				

CV = (STANDARD DEVIATION/MEAN)*100

REMARKS:

AA# K510350, FATHEAD MINNOW SURVIVAL, 10-13-05
File: k510350s Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.251

W = 0.971

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

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

AA# K510350, FATHEAD MINNOW SURVIVAL, 10-13-05
File: k510350s Transform: ARC SINE(SQUARE ROOT(Y))

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 2.33

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

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

TITLE: AA# K510350, FATHEAD MINNOW SURVIVAL, 10-13-05
FILE: k510350s
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	0.8000	1.1071
1	CONTROL	3	0.8000	1.1071
1	CONTROL	4	0.9000	1.2490
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	0.9000	1.2490
2	32 % EFFLUENT	5	0.9000	1.2490
3	42 % EFLLUENT	1	0.9000	1.2490
3	42 % EFLLUENT	2	1.0000	1.4120
3	42 % EFLLUENT	3	0.9000	1.2490
3	42 % EFLLUENT	4	1.0000	1.4120
3	42 % EFLLUENT	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	1.0000	1.4120
4	56 % EFFLUENT	5	0.9000	1.2490
5	75 % EFFLUENT	1	1.0000	1.4120
5	75 % EFFLUENT	2	0.9000	1.2490
5	75 % EFFLUENT	3	0.8000	1.1071
5	75 % EFFLUENT	4	1.0000	1.4120
5	75 % EFFLUENT	5	0.9000	1.2490
6	100 % EFFLUENT	1	0.9000	1.2490
6	100 % EFFLUENT	2	0.9000	1.2490
6	100 % EFFLUENT	3	0.9000	1.2490
6	100 % EFFLUENT	4	0.8000	1.1071
6	100 % EFFLUENT	5	1.0000	1.4120

AA# K510350, FATHEAD MINNOW SURVIVAL, 10-13-05
File: k510350s Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.084	0.017	1.598
Within (Error)	24	0.251	0.010	
Total	29	0.335		

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

AA# K510350, FATHEAD MINNOW SURVIVAL, 10-13-05
File: k510350s 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	1.225	0.880		
2	32 % EFFLUENT	1.282	0.920	-0.877	
3	42 % EFLLUENT	1.347	0.960	-1.884	
4	56 % EFFLUENT	1.379	0.980	-2.388	
5	75 % EFFLUENT	1.286	0.920	-0.942	
6	100 % EFFLUENT	1.253	0.900	-0.438	

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

AA# K510350, FATHEAD MINNOW SURVIVAL, 10-13-05
File: k510350s 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	0.114	12.9	-0.040
3	42 % EFLLUENT	5	0.114	12.9	-0.080
4	56 % EFFLUENT	5	0.114	12.9	-0.100
5	75 % EFFLUENT	5	0.114	12.9	-0.040
6	100 % EFFLUENT	5	0.114	12.9	-0.020

AA # K510350, FATHEAD MINNOW GROWTH, 10-13-05
File: k510350g Transform: NO TRANSFORMATION

Shapiro - Wilk's test for normality

D = 0.111

W = 0.959

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 # K510350, FATHEAD MINNOW GROWTH, 10-13-05
File: k510350g Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 12.98

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 # K510350, FATHEAD MINNOW GROWTH, 10-13-05
FILE: k510350g
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	0.5260	0.5260
1	CONTROL	2	0.4070	0.4070
1	CONTROL	3	0.3940	0.3940
1	CONTROL	4	0.4460	0.4460
1	CONTROL	5	0.4310	0.4310
2	32 % EFFLUENT	1	0.4170	0.4170
2	32 % EFFLUENT	2	0.4030	0.4030
2	32 % EFFLUENT	3	0.2910	0.2910
2	32 % EFFLUENT	4	0.3060	0.3060
2	32 % EFFLUENT	5	0.3680	0.3680
3	42 % EFFLUENT	1	0.3720	0.3720
3	42 % EFFLUENT	2	0.3560	0.3560
3	42 % EFFLUENT	3	0.3260	0.3260
3	42 % EFFLUENT	4	0.3480	0.3480
3	42 % EFFLUENT	5	0.3130	0.3130
4	56 % EFFLUENT	1	0.3530	0.3530
4	56 % EFFLUENT	2	0.3840	0.3840
4	56 % EFFLUENT	3	0.2440	0.2440
4	56 % EFFLUENT	4	0.3860	0.3860
4	56 % EFFLUENT	5	0.5250	0.5250
5	75 % EFFLUENT	1	0.4080	0.4080
5	75 % EFFLUENT	2	0.4280	0.4280
5	75 % EFFLUENT	3	0.3640	0.3640
5	75 % EFFLUENT	4	0.3960	0.3960
5	75 % EFFLUENT	5	0.3960	0.3960
6	100 % EFFLUENT	1	0.3120	0.3120
6	100 % EFFLUENT	2	0.4750	0.4750
6	100 % EFFLUENT	3	0.3370	0.3370
6	100 % EFFLUENT	4	0.3720	0.3720
6	100 % EFFLUENT	5	0.5590	0.5590

AA # K510350, FATHEAD MINNOW GROWTH, 10-13-05
File: k510350g Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.033	0.007	1.406
Within (Error)	24	0.111	0.005	
Total	29	0.143		

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

AA # K510350, FATHEAD MINNOW GROWTH, 10-13-05
File: k510350g 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	0.441	0.441		
2	32 % EFFLUENT	0.357	0.357	1.948	
3	42 % EFFLUENT	0.343	0.343	2.274	
4	56 % EFFLUENT	0.378	0.378	1.451	
5	75 % EFFLUENT	0.398	0.398	0.986	
6	100 % EFFLUENT	0.411	0.411	0.693	

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

AA # K510350, FATHEAD MINNOW GROWTH, 10-13-05
File: k510350g 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	0.101	23.0	0.084
3	42 % EFFLUENT	5	0.101	23.0	0.098
4	56 % EFFLUENT	5	0.101	23.0	0.062
5	75 % EFFLUENT	5	0.101	23.0	0.042
6	100 % EFFLUENT	5	0.101	23.0	0.030

APPENDIX D

Ceriodaphnia dubia Raw Data and Statistics

Ceriodaphnia dubia — **SURVIVAL AND REPRODUCTION TEST**

Discharger: Weston | Lab Number/s: KS10350 | Analyst: JG, JM, tb, TLT, HH

Location: | Test Start-Date/Time: 10-13-05 / 0900

Date Sample Collected: See COC | Test Stop-Date/Time: 10-20-05 / 0830

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	X	0	0	0	0	0	0	0	0	0	9	0	JM
2	0	⊖	0	0	0	0	0	0	0	0	0	9	0	tb
3	0	—	0	0	0	0	0	2	0	3	5	9	0.6	JG
4	3	—	1	4	5	6	4	7	6	2	38	9	4.2	JG
5	8	—	3	10	7	12	10	0	8	8	68	9	7.6	JG
6	1	—	5	5	10	10	13	12	11	11	78	9	8.7	TLT
7	6	—	8	9	7	11	11	14	10	12	88	9	9.8	HH
8												80%	3rd brood	
Total	18	X0	17	28	29	39	38	35	35	28	277	X̄=30.8	CV=27.5%	

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	X	0	0	0	0	0	0	0	0	9	0	JM
2	0	0	⊖	0	0	0	0	0	0	0	0	9	0	tb
3	0	3	—	0	2	0	0	3	0	5	13	9	1.4	JG
4	5	0	—	3	5	6	5	4	6	9	43	9	4.8	JG
5	10	8	—	7	0	10	7	0	12	0	54	9	6.0	JG
6	0	14	—	11	13	13	12	14	15	14	106	9	11.8	TLT
7	9	13	—	13	10	11	12	9	13	15	105	9	11.7	HH
8														
Total	24	38	X0	34	30	40	30	30	40	43	321			

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	10	0	JM
2	0	0	0	0	0	0	0	0	0	0	0	10	0	tb
3	0	5	0	0	0	0	0	3	0	4	12	10	1.2	JG
4	0	0	4	4	4	0	3	4	4	0	23	10	23	JG
5	8	9	6	8	9	0	10	0	9	8	57	10	5.7	JG
6	0	15	10	14	12	0	13	11	12	12	99	10	9.9	TLT
7	0	14	13	15	11	0	16	12	9	12	102	10	10.2	HH
8														
Total	0	41	33	41	36	0	42	30	34	36	293			

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	X	0	0	0	0	0	0	0	10	0	JM
2	0	0	0	⊖	0	0	0	0	0	0	0	10	0	tb
3	0	6	0	0	0	0	2	4	0	5	17	10	1.7	JG
4	4	6	4	4	5	5	6	5	4	0	43	10	4.3	JG
5	9	0	8	8	8	7	0	0	11	9	60	10	6.0	JG
6	4	13	11	13	11	12	11	13	13	15	116	10	11.6	TLT
7	11	12	13	14	9	10	15	9	11	16	120	10	12.0	HH
8														
Total	28	37	36	39	33	34	34	31	39	45	356			

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	JM
2	0	0	0	X	0	0	0	0	0	0	0	9	0	tb
3	0	5	0	—	0	0	0	4	0	5	14	9	1.6	JG
4	4	8	4	—	0	4	4	4	10	0	34	9	3.8	JG
5	10	0	10	—	0	8	9	0	16	6	53	9	5.9	JG
6	0	15	10	—	1	11	9	12	13	12	83	9	9.2	TLT
7	7	17	9	—	0	10	13	14	12	12	94	9	10.4	HH
8														
Total	21	45	33	X0	1	33	35	34	41	35	278			

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	X	0	0	0	0	0	0	9	0	JM
2	0	0	X0	0	⊖	0	0	0	0	0	0	8	0	tb
3	0	0	⊖	0	⊖	0	0	0	0	3	3	8	0.4	JG
4	4	0	—	4	—	4	3	4	5	0	24	8	3.0	JG
5	8	8	—	8	—	9	8	0	10	7	58	8	7.2	JG
6	9	0	—	10	—	10	9	12	10	9	69	8	8.6	TLT
7	14	6	—	12	—	16	13	14	7	12	94	8	11.8	HH
8														
Total	35	14	X0	34	X0	39	33	30	32	31	248	X̄=31.0	CV=28.9%	

X=DEAD; Y=MALE

FISHER'S EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	DEAD	TOTAL ANIMALS
CONTROL	9	1	10
32% EFFLUENT	9	1	10
TOTAL	18	2	20

CRITICAL FISHER'S VALUE (10,10,9) (p=0.05) IS 4. b VALUE IS 9.
Since b is greater than 4 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

FISHER'S EXACT TEST

IDENTIFICATION	NUMBER OF DEAD	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	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

IDENTIFICATION	NUMBER OF ALIVE	NUMBER OF DEAD	TOTAL ANIMALS
CONTROL	9	1	10
75% EFFLUENT	9	1	10
TOTAL	18	2	20

CRITICAL FISHER'S VALUE (10,10,9) (p=0.05) IS 4. b VALUE IS 9.
Since b is greater than 4 there is no significant difference between CONTROL and TREATMENT at the 0.05 level.

FISHER'S EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	NUMBER OF DEAD	TOTAL ANIMALS
CONTROL	9	1	10
100% EFFLUENT	8	2	10
TOTAL	17	3	20

CRITICAL FISHER'S VALUE (10,10,9) (p=0.05) IS 4. b VALUE IS 8.
Since b is greater than 4 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	1	
1	32% EFFLUENT	10	1	
2	42% EFFLUENT	10	0	
3	56% EFFLUENT	10	0	
4	75% EFFLUENT	10	1	
5	100% EFFLUENT	10	2	

AA# K510350,CERIODAPHNIA DUBIA REPRODUCTION, 10-13-05
File: K510350C 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# K510350,CERIODAPHNIA DUBIA REPRODUCTION, 10-13-05
File: K510350C Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 11.55

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# K510350,CERIODAPHNIA DUBIA REPRODUCTION, 10-13-05
FILE: K510350C
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	18.0000	18.0000
1	CONTROL	2	0.0000	0.0000
1	CONTROL	3	17.0000	17.0000
1	CONTROL	4	28.0000	28.0000
1	CONTROL	5	29.0000	29.0000
1	CONTROL	6	39.0000	39.0000
1	CONTROL	7	38.0000	38.0000
1	CONTROL	8	35.0000	35.0000
1	CONTROL	9	35.0000	35.0000
1	CONTROL	10	38.0000	38.0000
2	32 % EFFLUENT	1	24.0000	24.0000
2	32 % EFFLUENT	2	38.0000	38.0000
2	32 % EFFLUENT	3	0.0000	0.0000
2	32 % EFFLUENT	4	34.0000	34.0000
2	32 % EFFLUENT	5	30.0000	30.0000
2	32 % EFFLUENT	6	40.0000	40.0000
2	32 % EFFLUENT	7	36.0000	36.0000
2	32 % EFFLUENT	8	30.0000	30.0000
2	32 % EFFLUENT	9	46.0000	46.0000
2	32 % EFFLUENT	10	43.0000	43.0000
3	42 % EFFLUENT	1	0.0000	0.0000
3	42 % EFFLUENT	2	41.0000	41.0000
3	42 % EFFLUENT	3	33.0000	33.0000
3	42 % EFFLUENT	4	41.0000	41.0000
3	42 % EFFLUENT	5	36.0000	36.0000
3	42 % EFFLUENT	6	0.0000	0.0000
3	42 % EFFLUENT	7	42.0000	42.0000
3	42 % EFFLUENT	8	30.0000	30.0000
3	42 % EFFLUENT	9	34.0000	34.0000
3	42 % EFFLUENT	10	36.0000	36.0000
4	56 % EFFLUENT	1	28.0000	28.0000
4	56 % EFFLUENT	2	37.0000	37.0000
4	56 % EFFLUENT	3	36.0000	36.0000
4	56 % EFFLUENT	4	39.0000	39.0000
4	56 % EFFLUENT	5	33.0000	33.0000
4	56 % EFFLUENT	6	34.0000	34.0000
4	56 % EFFLUENT	7	34.0000	34.0000
4	56 % EFFLUENT	8	31.0000	31.0000
4	56 % EFFLUENT	9	39.0000	39.0000
4	56 % EFFLUENT	10	45.0000	45.0000
5	75 % EFFLUENT	1	21.0000	21.0000
5	75 % EFFLUENT	2	45.0000	45.0000
5	75 % EFFLUENT	3	33.0000	33.0000
5	75 % EFFLUENT	4	0.0000	0.0000
5	75 % EFFLUENT	5	1.0000	1.0000
5	75 % EFFLUENT	6	33.0000	33.0000
5	75 % EFFLUENT	7	35.0000	35.0000
5	75 % EFFLUENT	8	34.0000	34.0000
5	75 % EFFLUENT	9	41.0000	41.0000

5	75	%	EFFLUENT	10	35.0000	35.0000
6	100	%	EFFLUENT	1	35.0000	35.0000
6	100	%	EFFLUENT	2	14.0000	14.0000
6	100	%	EFFLUENT	3	0.0000	0.0000
6	100	%	EFFLUENT	4	34.0000	34.0000
6	100	%	EFFLUENT	5	0.0000	0.0000
6	100	%	EFFLUENT	6	39.0000	39.0000
6	100	%	EFFLUENT	7	33.0000	33.0000
6	100	%	EFFLUENT	8	30.0000	30.0000
6	100	%	EFFLUENT	9	32.0000	32.0000
6	100	%	EFFLUENT	10	31.0000	31.0000

AA# K510350,CERIODAPHNIA DUBIA REPRODUCTION, 10-13-05
File: K510350C Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	27.700				
2	32 % EFFLUENT	32.100	118.50	75.00	10.00	
3	42 % EFFLUENT	29.300	115.00	75.00	10.00	
4	56 % EFFLUENT	35.600	121.50	75.00	10.00	
5	75 % EFFLUENT	27.800	106.50	75.00	10.00	
6	100 % EFFLUENT	24.800	97.50	75.00	10.00	

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

APPENDIX E

Organism History

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: 10/13/05

SPECIES: Pimephales promelas

AGE: N/A

LIFE STAGE: Embryo

HATCH DATE: 10/13/05

BEGAN FEEDING: N/A

FOOD: N/A

Water Chemistry Record:	Current	Range
TEMPERATURE:	24°C	--
SALINITY/CONDUCTIVITY:	--	--
TOTAL HARDNESS (as $CaCO_3$):	124 mg/l	--
TOTAL ALKALINITY (as $CaCO_3$):	80 mg/l	--
pH:	7.83	--

Comments:

Facility Supervisor

Aquatic Research Organisms

DATA SHEET

I. Organism History

Species: Ceriodaphnia dubia

Source: Lab reared X 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: FT static renewal

Diet: Flake Food _____ Phytoplankton X Trout Chow _____

Brine Shrimp _____ Rotifers _____ Other YCT

Prophylactic Treatments: _____

Comments: All gravid as of 2:00pm EST

IV. Shipping Information

Client: Arkansas Analytical # of Organisms: 1 culture

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

Biologist: _____

1 - 800 - 927 - 1650

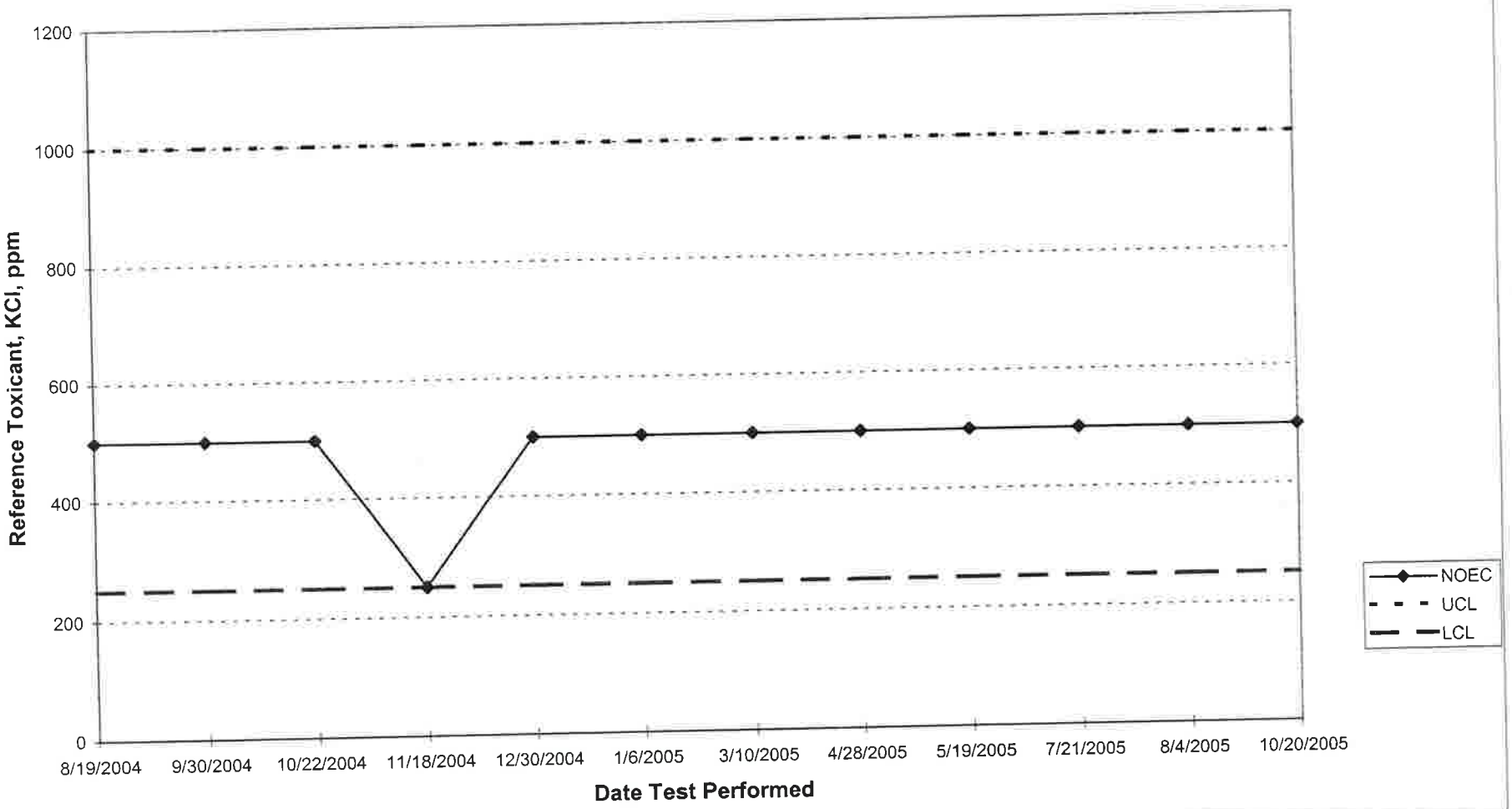
PO Box 1271 • One Lafayette Road • Hampton, NH 03842 • (603) 926-1650

APPENDIX F

Quality Assurance Charts

ARKANSAS ANALYTICAL, INC.

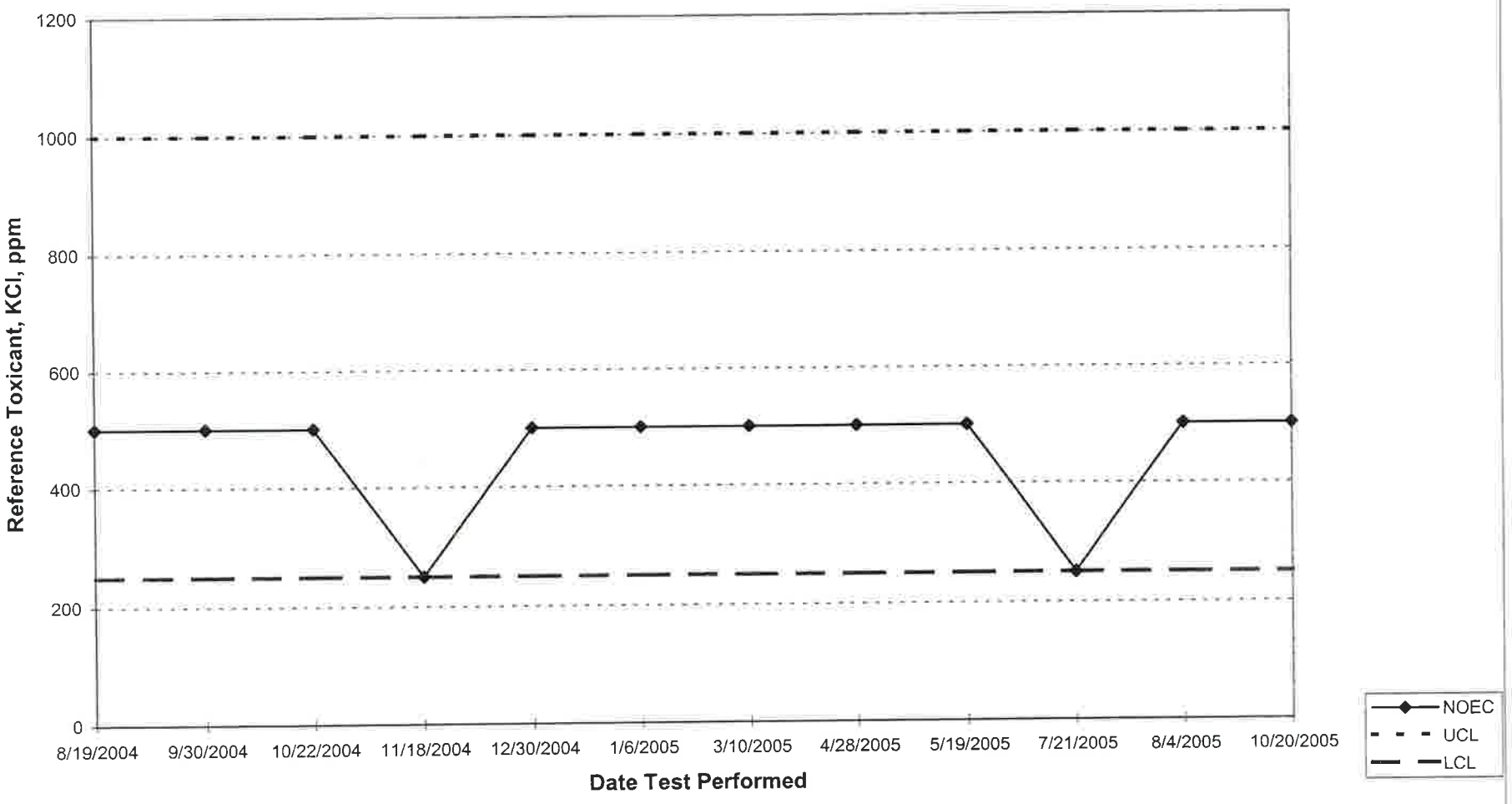
FATHEAD MINNOW SURVIVAL
QUALITY ASSURANCE



ARKANSAS ANALYTICAL, INC.

FATHEAD MINNOW GROWTH

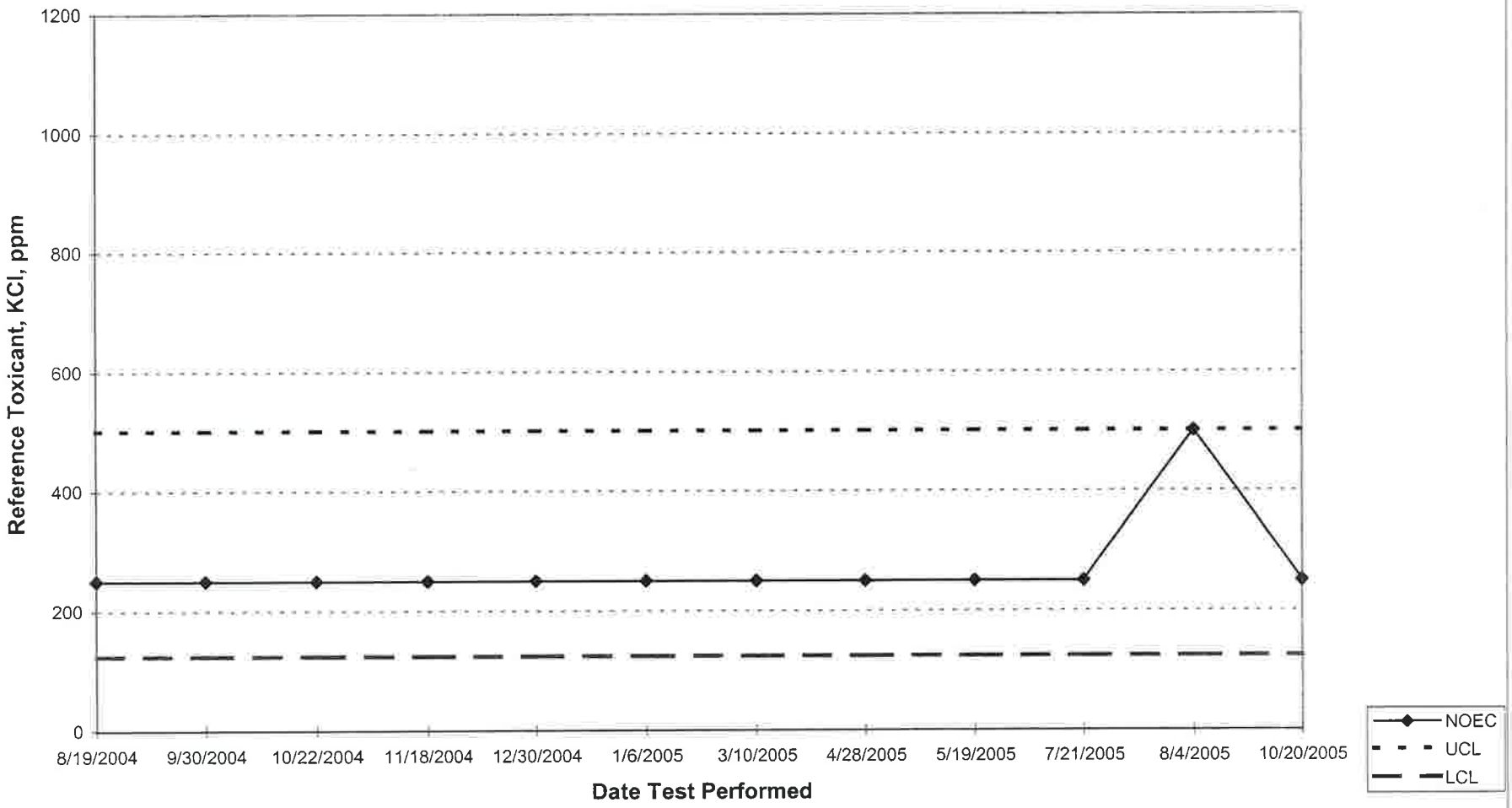
QUALITY ASSURANCE



ARKANSAS ANALYTICAL, INC.

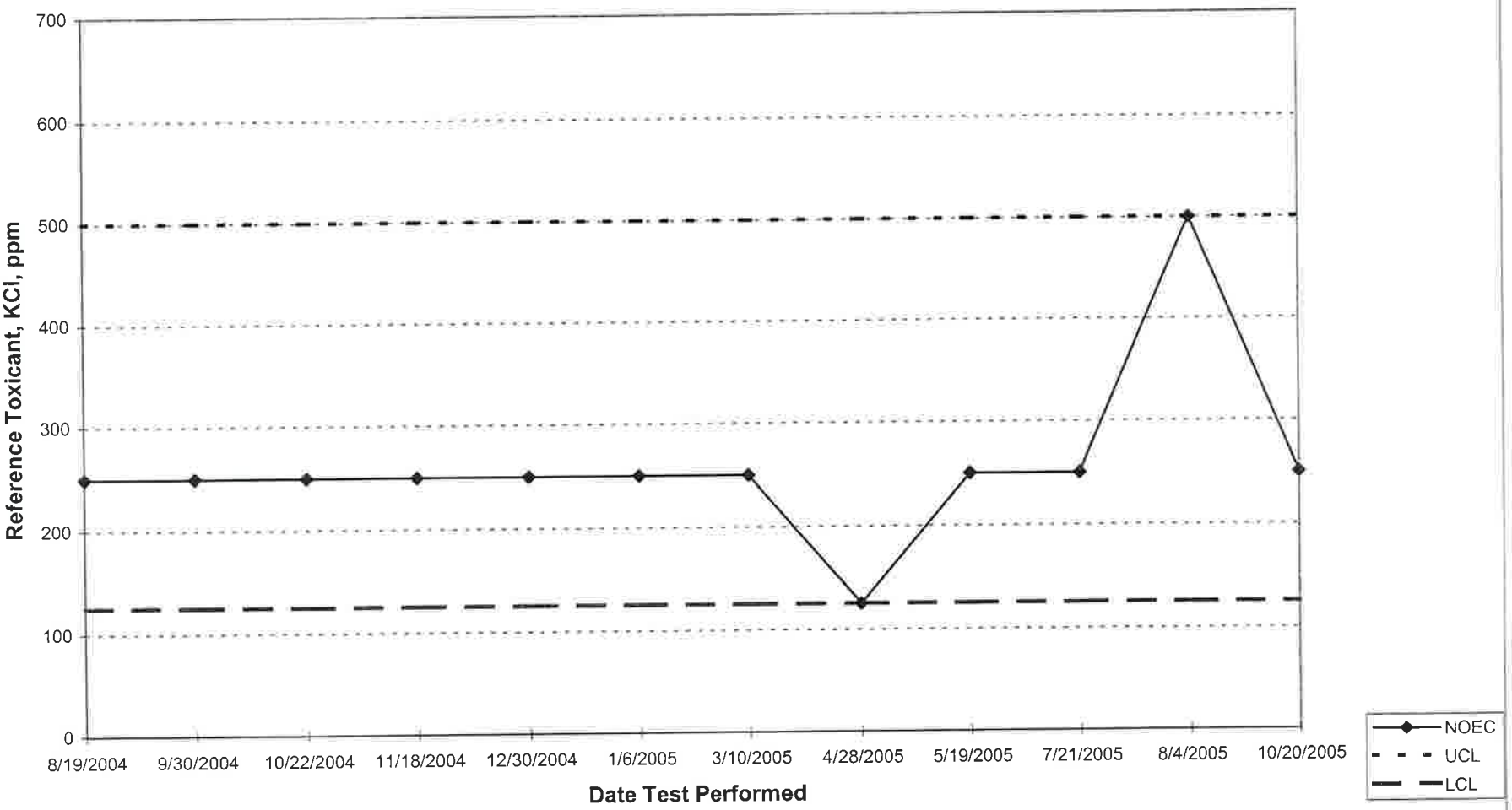
CERIODAPHNIA DUBIA SURVIVAL

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**

J A Semlerski

ADEQ Quality Assurance Officer

Date October 27, 2004