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

April 1, 2010

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

RE: **Toxicity Testing**
Magcobar Mine Site
1st QTR, 2010
Retest, Ceriodaphnia dubia

Lab Number K1003008

Dear Mr. Friedman:

Enclosed find report for toxicity testing for *ceriodaphnia dubia* . This is a retest which was required as a result of sublethal failure on an earlier test. Magacobar is routinely required to conduct testing bi-monthly.

The results of this test are as follows:

Organism	Survival (Lethal)	Growth/ Reproduction (Sublethal)
Pimephales Promelas	NA	NA
Ceriodaphnia dubia	Pass	Pass

Let me know if you have any questions or need further information.

Sincerely,

Norma James

Cc: Ken Pigue

Arkansas Analytical, Inc.

Toxicity Test Results

MAGCOBAR MINE SITE
NPDES PERMIT NUMBER: AR0049794
March, 2010
AFIN# 00-00348

Ceriodaphnia dubia, Survival and Reproduction Test
Test 1002.0

Prepared for: **Mr. David Friedman**
EEMA O&M Services Group
P.O. Box 232
Kulpsville, PA 19443

Prepared by: Arkansas Analytical, Inc.
11701 I-30, Bldg 1, Suite 115
Little Rock, Arkansas 72209
Lab Number K1003008

Monday, March 29, 2010

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 a retest for *Ceriodaphnia dubia* in March of 2010. This retest is required due to a sublethal failure on a previous test.

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:	3-16-10, 0930	3-17-10, 0930
Sample #2:	3-17-10, 0825	3-18-10, 0825
Sample #3:	3-21-10, 0825	3-22-10, 0825

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

The following information was collected upon immediate receipt of the samples at the laboratory:

Sample Receiving Information:	Date, Time Sample(s) Received	Temperature Upon Receipt (°C)
Sample #1:	3-17-10, 1125	4
Sample #2:	3-18-10, 1430	3
Sample #3:	3-23-10, 1435	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 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 1002.0 were < 24 hour old *Ceriodaphnia dubia* neonates, (all born within the same eight hours), obtained from an in-house culture. An organism history is provided in Appendix E.

Quality Assurance

Test Acceptability

TEST ACCEPTANCE CRITERIA for *Ceriodaphnia dubia*

Control Criteria	Results	Pass	Fail
Greater than or equal to 80% survival	100%	X	
Average of 15 or more young per surviving female	16.7	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	33.0%	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 2/11-18/10	
NOEC Survival:	500 ppm KCl
LOEC Survival:	1000 ppm KCl
NOEC Reproduction:	250 ppm KCl
LOEC Reproduction:	500 ppm KCl

Quality Assurance charts are provided in Appendix F.

Summary of Results
Magcobar Mine Site

Ceriodaphnia dubia	
NOEC / LOEC Survival	100% / NA
NOEC / LOEC Reproduction	100% / NA
Mean number of neonates (critical dilution)	15.0
%CV Reproduction (critical dilution)	17.8%
PMSD Reproduction	25.2

Conclusion

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

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

Biomonitoring Analysts:

Ken Pigue

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:	3-16-10, 0930	3-17-10, 0930
Sample #2:	3-17-10, 0825	3-18-10, 0825
Sample #3:	3-21-10, 0825	3-22-10, 0825

Test initiated (date, time): 3-18-10, 0915 Test terminated (date, time): 3-24-10, 0845

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	23	13	14	14	15	13
B	21	13	9	14	13	10
C	19	14	13	16	9	15
D	5	12	17	24	16	15
E	18	15	18	18	18	19
F	12	26	13	18	17	16
G	15	19	21	11	19	17
H	14	11	18	14	17	12
I	23	16	14	19	12	17
J	17	17	14	x7	17	16
Mean	16.7	15.6	15.1	15.5	15.3	15.0
Mean/surviving female	16.7	15.6	15.1	16.4	15.3	15.0
CV%*	33.0					17.8

X= Dead Adult; M= Male (Not considered in statistics)
*Coefficient of Variation = standard deviation/ mean * 100; CV% calculation based on young per surviving female

SUMMARY REPORTING FORMS FOR CHRONIC BIOMONITORING
Ceriodaphnia dubia SURVIVAL AND REPRODUCTION

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

PERCENT SURVIVAL

PERCENT EFFLUENT	0%	32%	42%	56%	75%	100%
Time of Reading: 24 HOURS	100	100	100	100	100	100
48 HOURS	100	100	100	100	100	100
Test termination	100	100	100	90	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)= _____**33.0**_____%

APPENDIX A

Chain of Custody Forms

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

CHAIN OF CUSTODY RECORD

CLIENT INFORMATION		Project Description	Turnaround Time
EEMA O & M Services Group	EEMA O & M Services Group	Magcobar Mine Site	24 Hour
Magcobar Mine Site	P.O. Box 732	Biomonitoring Sample	48 Hour
P.O. Box 699	Kulpsville, PA 19443	**Reporting Information**	72 Hour
Malvern, AR 72104		Telephone: 501-467-8355	Routine (5 Day)
Attn: Bill McAlister	Attn: Amber Rich	Fax: 501-467-8687	Preservative Code
		Email: dave.friedman@eema-inc.com; bmcalister@eema-inc.com; bhorton@eema-inc.com	Bottle Type

Preservation Codes:

1. Cool, 4 Degrees Centigrade
2. Sulfuric Acid (H_2SO_4), pH < 2
3. Nitric Acid (HNO_3), pH < 2
4. Thiosulfate for Dechlorination
5. Hydrochloric Acid(HCl)
6. Sodium Hydroxide (NaOH), pH > 12

Bottle Type Code: G = Glass; P = Plastic; V = Septum; A = Amber

Sampler(s) Signature: Bill Mc Alister

Sampler(s) Printed: Bill Mc Alister

Field Number	SAMPLE COLLECTION Date/s	Time/s	Grab	Comp	Number of Bottles	Sample Matrix	SAMPLE IDENTIFICATION/ DESCRIPTION	Chronic Biomonitoring	TEST PARAMETERS	Arkansas Analytical Work Order Number:
FD-1 Comp.	3/17/2010	9:30 AM		X	4	W	Facility Discharge (Re-Test)	X		K1003008 A

1. Relinquished by: (Signature)	Date/Time	2. Received by: (Signature)
Bill Mc Alister	3-17-10 1125	
3. Relinquished by: (Signature)	Date/Time	4. Received by lab: (Signature)
		Sarah E Ross

SAMPLE CONDITION UPON RECEIPT IN LAB

1. CUSTODY SEALS:	✓ Yes	No
2. CONTAINERS CORRECT:	Yes	No
3. COC/LABELS AGREE:	Yes	No
4. PRESERVATION CONFIRMED:	Yes	No
5. RECEIVED ON ICE:	Yes	No
6. TEMPERATURE ON RECEIPT:	2°C	

FOR COMPLETION BY LAB ONLY

REMARKS / SAMPLE COMMENTS

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

CHAIN OF CUSTODY RECORD

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

Preservation Codes:
1. Cool, 4 Degrees Centigrade
2. Sulfuric Acid (H_2SO_4), pH < 2
3. Nitric Acid (HNO_3), pH < 2
4. Thiosulfate for Dechlorination
5. Hydrochloric Acid(HCl)
6. Sodium Hydroxide (NaOH), pH > 12

Bottle Type Code: G = Glass; P = Plastic; V = Septum; A = Amber

Sampler(s) Signature: Bill McAlister

Sampler(s) Printed: Bill McAlister

Field Number	SAMPLE COLLECTION Date/s	Time/s	Grab	Comp	Number of Bottles	Sample Matrix	SAMPLE IDENTIFICATION/ DESCRIPTION	Chronic Biomonitoring	TEST PARAMETERS	Arkansas Analytical Work Order Number:
FD-1 Comp.	3/18/2010	8:25 AM		X	3	W	Facility Discharge (Re-Test)	X		KD03008 B

1. Relinquished by: (Signature)	Date/Time	2. Received by: (Signature)
Bill McAlister	3-18-10 1430	
3. Relinquished by: (Signature)	Date/Time	4. Received by lab: (Signature)
		Ronse

SAMPLE CONDITION UPON RECEIPT IN LAB

1. CUSTODY SEALS:	✓ Yes	___ No
2. CONTAINERS CORRECT:	___ Yes	___ No
3. COC/LABELS AGREE:	___ Yes	___ No
4. PRESERVATION CONFIRMED:	___ Yes	___ No
5. RECEIVED ON ICE:	___ Yes	___ No
6. TEMPERATURE ON RECEIPT:	4°C	

FOR COMPLETION BY LAB ONLY

REMARKS / SAMPLE COMMENTS

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

CHAIN OF CUSTODY RECORD

CLIENT INFORMATION	
EEMA O & M Services Group	EEMA O & M Services Group
Magcobar Mine Site	P.O. Box 732
P.O. Box 699	Kulpsville, PA 19443
Malvern, AR 72104	
Attn: Bill McAlister	Attn: Amber Rich

Project Description
Magcobar Mine Site
Biomonitoring Sample

Reporting Information
Telephone: 501-467-8355
Fax: 501-467-8687
Email: dave.friedman@eema-inc.com; bmcalister@eema-inc.com; bhorton@eema-inc.com

Turnaround Time
24 Hour
48 Hour
72 Hour
Routine (5 Day)

Preservation Codes:
1. Cool, 4 Degrees Centigrade
2. Sulfuric Acid (H_2SO_4), pH < 2
3. Nitric Acid (HNO_3), pH < 2
4. Thiosulfate for Dechlorination
5. Hydrochloric Acid(HCl)
6. Sodium Hydroxide (NaOH), pH > 12

Preservative Code: 1
Bottle Type: P

Bottle Type Code: G = Glass; P = Plastic; V = Septum; A = Amber

Sampler(s) Signature: Bill McAlister
Sampler(s) Printed: Bill McAlister

Arkansas Analytical Work Order Number: K1003008

Field Number	SAMPLE COLLECTION Date/s	Time/s	Grab	Comp	Number of Bottles	Sample Matrix	SAMPLE IDENTIFICATION/ DESCRIPTION	TEST PARAMETERS: Chronic Biomonitoring	Bottle Type Code
FD-2 Comp.	3/22/2010	8:25 AM		X	3	W	Facility Discharge (Re-Test)	X	C

1. Relinquished by: (Signature)	Date/Time	2. Received by: (Signature)
Bill McAlister	3-23-10 1435	
3. Relinquished by: (Signature)	Date/Time	4. Received by lab: (Signature)
		Sarah E Ronse

SAMPLE CONDITION UPON RECEIPT IN LAB

1. CUSTODY SEALS:	✓ Yes	No
2. CONTAINERS CORRECT:	Yes	No
3. COC/LABELS AGREE:	Yes	No
4. PRESERVATION CONFIRMED:	Yes	No
5. RECEIVED ON ICE:	Yes	No
6. TEMPERATURE ON RECEIPT:	4°C	

FOR COMPLETION BY LAB ONLY

REMARKS / SAMPLE COMMENTS

APPENDIX B

Effluent and Dilution Water Data

CHEMICAL DATA SHEET FOR CHRONIC TOXICITY TESTING										Cerodaphnia Dubia
Lab # / Sample ID		K1003008			Test Start (Date/Time)			3/18/10		
Client		Weston			Test End (Date/Time)			3/25/10		
		Day of Test								
		1	2	3	4	5	6	7	notes/remarks	
Control		3/18	3/19	3/20	3/21	3/22	3/23	3/24		
D.O. (mg/L)	INITIAL	7.9	6.7	7.3	8.2	7.4	8.5	8.6		
	FINAL	7.8	7.6	7.7	7.9	7.6	7.7			
pH (s.u.)	INITIAL	7.2	7.4	7.1	6.9	7.4	7.3	7.6		
	FINAL	7.9	7.7	7.8	7.5	7.5	7.6			
temp (C)	INITIAL	23.3	21.9	22.8	20.3	23.3	23.5	21.4		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0			
ALKALINITY (mg/L)		22								
HARDNESS (mg/L)		48								
CONDUCTIVITY (umhos/cm)		142								
CHLORINE (mg/L)		<0.05								
CONC: 32										
D.O. (mg/L)	INITIAL	7.6	8.0	8.0	8.8	8.6	8.7	8.7		
	FINAL	7.7	7.6	7.6	7.9	7.6	7.6			
pH (s.u)	INITIAL	7.3	7.4	7.1	6.9	7.1	6.9	7.3		
	FINAL	7.5	7.4	7.1	6.8	7.0	7.3			
temp (C)	INITIAL	22.5	22.0	22.9	20.4	22.3	22.7	21.6		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0			
CONC: 42										
D.O. (mg/L)	INITIAL	7.7	8.4	8.3	9.0	8.7	8.7	8.7		
	FINAL	7.7	7.6	7.5	7.8	7.6	7.5			
pH (mg/L)	INITIAL	7.3	7.4	7.2	6.9	7.2	7.0	7.3		
	FINAL	7.5	7.4	7.1	6.8	7.1	7.3			
temp (C)	INITIAL	22.4	22.0	22.9	20.5	22.1	22.7	21.7		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0			
CONC: 56										
D.O. (mg/L)	INITIAL	8.2	8.7	8.6	9.2	8.7	8.8	8.8		
	FINAL	7.8	7.6	7.5	7.8	7.7	7.5			
pH (s.u.)	INITIAL	7.3	7.4	7.2	7.1	7.2	7.1	7.3		
	FINAL	7.5	7.3	7.1	7.1	7.1	7.2			
temp (C)	INITIAL	22.3	22.1	23.0	20.7	22.2	22.8	21.9		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0			
CONC: 75										
D.O. (mg/L)	INITIAL	8.9	8.7	8.8	9.6	8.7	9.0	8.6		
	FINAL	7.9	7.6	7.5	7.8	7.7	7.7			
pH (s.u.)	INITIAL	7.2	7.3	7.1	7.0	7.1	7.1	7.3		
	FINAL	7.4	7.2	7.1	7.1	7.1	7.2			
temp (C)	INITIAL	22.3	22.5	23.0	20.9	22.4	22.9	22.1		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0			
CONC: 100										
D.O. (mg/L)	INITIAL	9.0	9.1	8.4	10.4	8.9	9.1	8.8		
	FINAL	8.1	7.6	7.6	7.8	7.6	7.7			
pH (s.u.)	INITIAL	7.2	7.3	7.1	6.9	7.1	7.0	7.1		
	FINAL	7.4	7.3	7.0	6.9	7.0	7.1			
temp (C)	INITIAL	22.4	22.8	23.6	21.3	23.1	23.0	22.5		
	FINAL	25.0	25.0	25.0	25.0	25.0	25.0			
CONC: 100%		A	A	A	B	B	C	C		
ALKALINITY (mg/L)		8			10		8			
HARDNESS (mg/L)		>600			>600		>600			
CONDUCTIVITY (umhos/cm)		20400			20600		20500			
CHLORINE (mg/L)		0.05			<0.05		<0.05			

APPENDIX D

Ceriodaphnia dubia Raw Data and Statistics

SURVIVAL AND REPRODUCTION TEST

Cerodaphnia dubia

Discharger: Weston | Lab Number/s: K1003008

Location:

Date Sample Collected:

Analyst: KP

Test Start - Date/ Time: 3/18/10 0915

Test Stop - Date/Time: 3/24/10, 0845

Conc 1

%	Day	A	B	C	D	E	F	G	H	I	J	No. of Young	No. of Adult	Young/ Adult	Analyst
0	1	m	0	0	0	0	0	0	0	0	0	0	10	0	KP
	2	•	0	0	0	0	0	0	0	0	0	0	10	0	ct
	3	4	4	3	3	2	0	1	5	3	0	25	10	2.5	KP
	4	2	1	0	2	0	4	3	3	5		22	10	2.2	KP
	5	6	4	1	3	5	5	0	8	5		40	10	4.0	KP
	6	11	9	14	1	11	7	5	6	9	7	80	10	8.0	KP
	7														
	8														
	Total	23	21	19	5	18	12	15	14	23	17	167		X=	16.7
														CV=	33.0

Conc 2

%	Day	A	B	C	D	E	F	G	H	I	J	No. of Young	No. of Adult	Young/ Adult	Analyst
32	1	0	0	0	0	0	0	0	0	0	0	0	10	0	
	2	0	0	0	0	0	0	0	0	0	0	0	10	0	ct
	3	4	0	1	0	2	5	2	0	0	2	16	10	1.6	KP
	4	4	7	5	3	1	4	4	0	2	2	27	10	2.7	KP
	5	2	5	1	7	5	3	6	4	8	5	48	10	4.8	KP
	6	3	6	7	2	5	12	7	7	6	8	65	10	6.5	KP
	7														
	8														
	Total	13	13	14	12	15	26	19	11	16	17	156			

Conc 3

%	Day	A	B	C	D	E	F	G	H	I	J	No. of Young	No. of Adult	Young/ Adult	Analyst
42	1	0	0	0	0	0	0	0	0	0	0	0	10	0	
	2	0	0	0	0	0	0	0	0	0	0	0	10	0	ct
	3	1	0	2	2	1	0	2	4	4	0	16	10	1.6	
	4	1	2	1	3	2	1	2	0	0	2	15	10	1.5	
	5	5	2	2	4	6	3	6	5	3	4	40	10	4.0	
	6	7	6	8	8	9	7	11	9	7	8	80	10	8.0	
	7														
	8														
	Total	14	9	13	17	18	13	21	18	14	14	157			

X= DEAD; Y= MALE

Conc 4

%	Day	A	B	C	D	E	F	G	H	I	J	No. of Young	No. of Adult	Young/ Adult	Analyst
56	1	0	0	0	0	0	0	0	0	0	0	0	10	0	
	2	0	0	0	0	0	0	0	0	0	0	0	10	0	ct
	3	1	1	2	5	4	3	0	1	0	2	19	10	1.9	
	4	3	0	2	2	0	4	1	1	4	1	16	10	1.6	
	5	3	6	4	9	3	5	2	3	6	4	45	10	4.5	
	6	7	7	10	8	11	6	8	9	9	0x	55	9	8.3	
	7														
	8														
	Total	14	14	16	24	18	18	11	14	19	7X	155			

Conc 5

%	Day	A	B	C	D	E	F	G	H	I	J	No. of Young	No. of Adult	Young/ Adult	Analyst
75	1	0	0	0	0	0	0	0	0	0	0	0	10	0	
	2	0	0	0	0	0	0	0	0	0	0	0	10	0	ct
	3	0	0	0	2	0	1	4	2	0	0	9	10	0.9	
	4	2	3	1	1	3	0	3	3	0	1	17	10	1.7	
	5	5	2	6	4	6	5	3	5	3	5	44	10	4.4	
	6	8	8	2	9	9	11	9	7	9	11	83	10	8.3	
	7														
	8														
	Total	15	13	9	16	18	17	19	17	12	17	153			

Conc 6

%	Day	A	B	C	D	E	F	G	H	I	J	No. of Young	No. of Adult	Young/ Adult	Analyst
100	1	0	0	0	0	0	0	0	0	0	0	0	10	0	
	2	0	0	0	0	0	0	0	0	0	0	0	10	0	ct
	3	0	1	2	2	0	1	1	0	0	0	7	10	0.7	
	4	0	0	4	0	3	0	2	0	1	4	14	10	1.4	
	5	4	2	4	9	6	4	2	4	6	3	36	10	3.6	
	6	9	7	5	12	10	11	12	8	10	9	93	10	9.3	
	7														
	8														
	Total	13	10	15	15	19	16	17	12	17	16	150			

X= 15.0

CV= 17.8

2007

AA # K1003008 C. DUBIA CHRONIC, REPRODUCION, 3-18-10
File: Z:\TOXSTAT\MONTE\CD. Transform: NO TRANSFORMATION

Shapiro - Wilk's test for normality

******** Shapiro - Wilk's Test is aborted ********

This test can not be performed because total number of replicates
is greater than 50.

Total number of replicates = 60

AA # K1003008 C. DUBIA CHRONIC, REPRODUCION, 3-18-10
File: Z:\TOXSTAT\MONTE\CD. Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 6.38

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

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

FISHER'S EXACT TEST

IDENTIFICATION	NUMBER OF ALIVE	DEAD	TOTAL ANIMALS
CONTROL	10	0	10
32%	10	0	10
TOTAL	20	0	20

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

FISHER'S EXACT TEST

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

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

FISHER'S EXACT TEST

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

TOTAL	19	1	20

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

FISHER'S EXACT TEST

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

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

FISHER'S EXACT TEST

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

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

SUMMARY OF FISHER'S EXACT TESTS

	NUMBER	NUMBER	SIG

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

TITLE: AA # K1003008 C. DUBIA CHRONIC, REPRODUCION, 3-18-10
FILE: Z:\TOXSTAT\MONTE\CD.
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	23.0000	23.0000
1	CONTROL	2	21.0000	21.0000
1	CONTROL	3	19.0000	19.0000
1	CONTROL	4	5.0000	5.0000
1	CONTROL	5	18.0000	18.0000
1	CONTROL	6	12.0000	12.0000
1	CONTROL	7	15.0000	15.0000
1	CONTROL	8	14.0000	14.0000
1	CONTROL	9	23.0000	23.0000
1	CONTROL	10	17.0000	17.0000
2	32 % EFFLUENT	1	13.0000	13.0000
2	32 % EFFLUENT	2	13.0000	13.0000
2	32 % EFFLUENT	3	14.0000	14.0000
2	32 % EFFLUENT	4	12.0000	12.0000
2	32 % EFFLUENT	5	15.0000	15.0000
2	32 % EFFLUENT	6	26.0000	26.0000
2	32 % EFFLUENT	7	19.0000	19.0000
2	32 % EFFLUENT	8	11.0000	11.0000
2	32 % EFFLUENT	9	16.0000	16.0000
2	32 % EFFLUENT	10	17.0000	17.0000
3	42 % EFFLUENT	1	14.0000	14.0000
3	42 % EFFLUENT	2	9.0000	9.0000
3	42 % EFFLUENT	3	13.0000	13.0000
3	42 % EFFLUENT	4	17.0000	17.0000
3	42 % EFFLUENT	5	18.0000	18.0000
3	42 % EFFLUENT	6	13.0000	13.0000
3	42 % EFFLUENT	7	21.0000	21.0000
3	42 % EFFLUENT	8	18.0000	18.0000
3	42 % EFFLUENT	9	14.0000	14.0000
3	42 % EFFLUENT	10	14.0000	14.0000
4	56 % EFFLUENT	1	14.0000	14.0000
4	56 % EFFLUENT	2	14.0000	14.0000
4	56 % EFFLUENT	3	16.0000	16.0000
4	56 % EFFLUENT	4	24.0000	24.0000
4	56 % EFFLUENT	5	18.0000	18.0000
4	56 % EFFLUENT	6	18.0000	18.0000
4	56 % EFFLUENT	7	11.0000	11.0000
4	56 % EFFLUENT	8	14.0000	14.0000

4	56 % EFFLUENT	9	19.0000	19.0000
4	56 % EFFLUENT	10	7.0000	7.0000
5	75 % EFFLUENT	1	15.0000	15.0000
5	75 % EFFLUENT	2	13.0000	13.0000
5	75 % EFFLUENT	3	9.0000	9.0000
5	75 % EFFLUENT	4	16.0000	16.0000
5	75 % EFFLUENT	5	18.0000	18.0000
5	75 % EFFLUENT	6	17.0000	17.0000
5	75 % EFFLUENT	7	19.0000	19.0000
5	75 % EFFLUENT	8	17.0000	17.0000
5	75 % EFFLUENT	9	12.0000	12.0000
5	75 % EFFLUENT	10	17.0000	17.0000
6	100 % EFFLUENT	1	13.0000	13.0000
6	100 % EFFLUENT	2	10.0000	10.0000
6	100 % EFFLUENT	3	15.0000	15.0000
6	100 % EFFLUENT	4	15.0000	15.0000
6	100 % EFFLUENT	5	19.0000	19.0000
6	100 % EFFLUENT	6	16.0000	16.0000
6	100 % EFFLUENT	7	17.0000	17.0000
6	100 % EFFLUENT	8	12.0000	12.0000
6	100 % EFFLUENT	9	17.0000	17.0000
6	100 % EFFLUENT	10	16.0000	16.0000

AA # K1003008 C. DUBIA CHRONIC, REPRODUCION, 3-18-10
File: Z:\TOXSTAT\MONTE\CD. Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	18.933	3.787	0.228
Within (Error)	54	898.000	16.630	
Total	59	916.933		

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

AA # K1003008 C. DUBIA CHRONIC, REPRODUCION, 3-18-10
File: Z:\TOXSTAT\MONTE\CD. Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	CONTROL	16.700	16.700		
2	32 % EFFLUENT	15.600	15.600	0.603	
3	42 % EFFLUENT	15.100	15.100	0.877	
4	56 % EFFLUENT	15.500	15.500	0.658	
5	75 % EFFLUENT	15.300	15.300	0.768	
6	100 % EFFLUENT	15.000	15.000	0.932	

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

AA # K1003008 C. DUBIA CHRONIC, REPRODUCION, 3-18-10
File: Z:\TOXSTAT\MONTE\CD. Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	CONTROL	10			
2	32 % EFFLUENT	10	4.213	25.2	1.100
3	42 % EFFLUENT	10	4.213	25.2	1.600
4	56 % EFFLUENT	10	4.213	25.2	1.200
5	75 % EFFLUENT	10	4.213	25.2	1.400
6	100 % EFFLUENT	10	4.213	25.2	1.700

AA # K1003008 C. DUBIA CHRONIC, REPRODUCION, 3-18-10
File: Z:\TOXSTAT\MONTE\CD. Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	16.700				
2	32 % EFFLUENT	15.600	92.50	75.00	10.00	
3	42 % EFFLUENT	15.100	90.50	75.00	10.00	
4	56 % EFFLUENT	15.500	96.00	75.00	10.00	
5	75 % EFFLUENT	15.300	92.50	75.00	10.00	
6	100 % EFFLUENT	15.000	90.00	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: 6/22/09

SPECIES: *Ceriodaphnia dubia*

AGE: Variable

LIFE STAGE: Adult

HATCH DATE: Variable

BEGAN FEEDING: Immediately

FOOD: YTC, *Selenastrum* sp.

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

Comments:

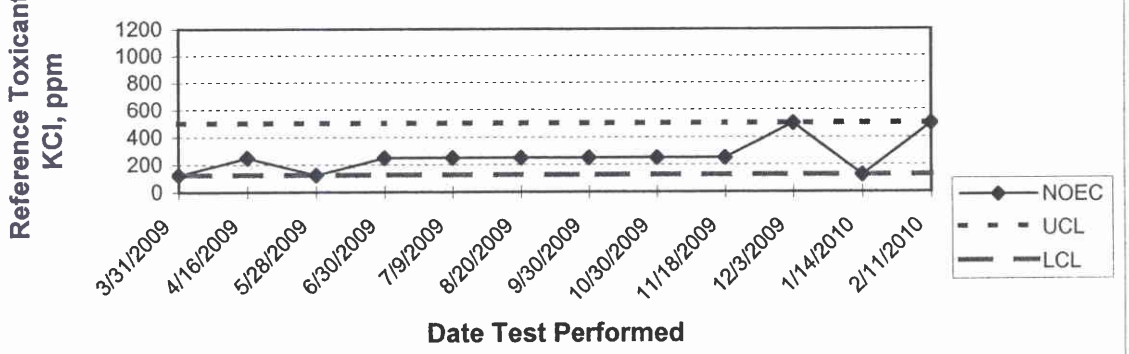
Facility Supervisor

APPENDIX F

Quality Assurance Charts

ARKANSAS ANALYTICAL, INC.

CERIODAPHNIA DUBIA SURVIVAL
QUALITY ASSURANCE



ARKANSAS ANALYTICAL, INC.

CERIODAPHNIA DUBIA REPRODUCTION
QUALITY ASSURANCE