

WYNNE WATER UTILITIES  
WYNNE, ARKANSAS  
72396

Date: April 22, 2014

To: ADEQ  
NPDED Enforcement Section  
5301 Northshore Dr.  
North Little Rock, Arkansas

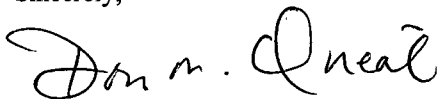
Re: Toxicity Testing Reduction

To Whom It May Concern:

This is to certify that no test failures have occurred and that all tests meet all test acceptability criteria on Page 13 of Part II Item 6.a of the Permit effective April 1, 2013 for the past four quarters. This is a formal request that our testing be reduced from quarterly to semiannual. The list of each test performed including test initiation date, species, NOECs for lethal and sub-lethal effects and the maximum coefficient of variation for the controls are listed below.

If you have any questions or concerns I can be reach at the above number.

Sincerely,



Don M. O'Neal  
General Manager  
Wynne Water Utilities

Date	Species	NOEC %	Coefficient of Variation
6/10/13	Pimephales promela	100	4.0%
6/10-13	Ceriodaphina dubia	100	10.2%
9/09/13	Pimephales promela	100	3.3%
9/09/13	Ceriodaphina dubia	100	6.5%
12/13/13	Pimephales promela	100	2.7%
12/13/13	Ceriodaphina dubia	100	11.9%
3/11/14	Pimephales promela	100	3.4%
3/11/14	Ceriodaphina dubia	100	12.2%



**SORRELLS RESEARCH  
LABORATORY AND FIELD SERVICES**



CHEMISTS  
ECOLOGISTS  
CONSULTANTS  
PLANNERS

8100 National Drive  
Little Rock, Arkansas 72209

Phone 501-562-8139  
Fax 501-562-7025  
Toll Free 1-800-331-8139

LABORATORY ANALYSIS

Date of Report: April 21, 2014  
Date Received : March 10, 2014

For: WYNNE WATER UTILITIES  
121 EAST MERRIMAN  
WYNNE, AR 72396-

Job: NPDES MONITORING PERMIT NO: AR0021903 1/QTR

Sample From: POST AERATION BASIN-COMP 03/09-10/14 0700-0700 / BIO-MONITORING

ANALYTE		RESULT	UNITS	METHOD
Bioassay, Ceriodaphnia dubia, chronic	=	100.000	Rp_NOEC, %	1002.0
Bioassay, Fathead minnow, chronic	=	100.000	Gr_NOEC, %	1000.0
Bioassay, Ceriodaphnia dubia- chronic	=	100.000	Sv-NOEC, %	1002.0
Bioassay, Fathead minnow, chronic	=	100.000	Sv_NOEC, %	1000.0

STANDARD METHODS, 20TH ED.; EPA METHODS, 3RD ED.

Collected by:

MAHDI HADDADI on 03/10/14 at 7:00

Analysis by :

SEE ATTACHED QUALITY ASSURANCE PAGE.

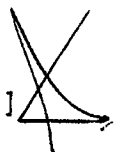
Sample preservation and Laboratory Analysis conducted according to EPA 40 CFR Part 136. Test/Analyst/Time/Coeff./Var./ QA plan filed with ADPC&E. Includes 10 % replication and 10 % recovery studies by random selection. Instruments maintained and calibrated and records kept. See Attached.

Copies to:

MR. HARRELL WILLIAMS  
OPERATOR  
121 EAST MERRIMAN

WYNNE, AR 72396-

Laboratory Number: 16936.0001B TKR Reviewed By: K. E. Sorrells, M.S. [ ]





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Toll Free 1-800-331-8139

**QUALITY ASSURANCE**

March 10, 2014

The following QA represents SRA's Quality Assurance values for this report.

ANALYTE	ANALYST	BEG. DATE	BEG. TIME	FIN. DATE	FIN. TIME	S.D. %	SPK. REC.	#IN BAT
Bioassay, Ceriodaphnia du	BAT	03/11/14	1415	03/17/14	1110	0.00	0.0	1
Bioassay, Fathead minnow,	BAT	03/11/14	1530	03/17/14	1000	0.00	0.0	1

Field PH/TEMP/D.O. Sampler or Courier/ at time of sampling or pick up  
Sample preservation and laboratory analysis conducted according to EPA  
40 CFR Part 136 TEST/ANALYST/TIME/COEF. VAR.\* QA PLAN filed with  
ADPC&E. Include replication.

KES = K. E. Sorrells  
JBS = James B. Sorrells  
CAS = Cecil A. Sorrells  
MKM = Mark Kyle McKenzie

KESII = K. E. Sorrells, II  
TJS = Todd J. Sanders  
JHD = J. Henry Dodson

Laboratory Number: 16936.0001B TKR

TURNAROUND TIME  
 RUSH 24HR. 48HR.  
 5 DAY REG.  
 OTHER:

FOR LAB/OFFICE USE ONLY

LAB # 16936-0001B  
 CLIENT # 4523  
 P. O. # \_\_\_\_\_

STANDARD METHODS PRESERVATION PER EPA 40 CFR

C 4 = COOL TO 4.0 C  
 S < 2 = SULFURIC ACID TO PH < 2  
 N < 2 = NITRIC ACID TO PH > 2  
 T = THIOSULFATE  
 W = AZIDE MODIFICATION (4500-0 C)  
 P = MEMBRANE ELECTRODE (4500-0 G)  
 NaOH = Ph > 12

NAME OF COMPANY, CITY, OR PROJECT:

PROJECT NO:

SAMPLER(S) SIGNATURE/PRINT

WYNNE WATER UTILITIES

*Harrell Williams* (HARRELL WILLIAMS)

SAMPLE NO.	SAMPLE COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP/GRAB	FIELD ANALYSIS				D.O. (W)	CONTAINER TYPE	ANALYSIS REQUIRED
					PH	TEMP	FLOW	CL2			
	POST AERATION BASIN OUTFALL	3/9/14 7:00 AM	3/10/14 7:00 AM	COMP/24			1.634			6 - 1/2 GAL	BIO-MONITORING

METHOD OF SHIPMENT (CIRCLE)	FIELD CALIBRATION RECORD	NOTES/COMMENTS/OBSERVATIONS
FED-EX WALK-IN <u>SRA</u> UPS OTHER	PH 7	Temp at Lab 7.9°
	PH 4	
TYPE OF SAMPLE(S): (CIRCLE)	PH 10	
WATER SOIL <u>WW</u> SLUDGE OTHER	D. O.	
FIELD ANALYSIS CONDUCTED BY <u>SRA</u> CLIENT		

RELINQUISHED BY:	DATE/TIME	RECEIVED BY:	DATE/TIME
		<i>[Signature]</i>	1226 3-10-14
RELINQUISHED BY:	DATE/TIME	RECEIVED BY:	DATE/TIME
		<i>[Signature]</i>	1530 3-14

TURNAROUND TIME  
 RUSH 24HR. 48HR.  
 6 DAY REG.  
 OTHER:

FOR LAB/OFFICE USE ONLY

LAB # 16936-0002B  
 CLIENT # 45023  
 P. O. #       

STANDARD METHODS PRESERVATION PER EPA 40 CFR

C 4 = COOL TO 4.0 C  
 S < 2 = SULFURIC ACID TO PH < 2  
 N < 2 = NITRIC ACID TO PH > 2  
 T = THIOSULFATE  
 W = AZIDE MODIFICATION (4500-0 C)  
 P = MEMBRANE ELECTRODE (4500-0 G)  
 NaOH = Ph > 12

NAME OF COMPANY, CITY, OR PROJECT:

PROJECT NO:

SAMPLER(S) SIGNATURE/PRINT

WYNNE WATER UTILITIES

*Harrell Williams* (HARRELL WILLIAMS)

SAMPLE NO.	SAMPLE COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP/GRAB	FIELD ANALYSIS				D.O. (W)	CONTAINER TYPE	ANALYSIS REQUIRED
					PH	TEMP	FLOW	CL2			
	POST AERATION BASIN OUTFALL	3/11/14 7:00 AM	3/12/14 7:00 AM	COMP/24			1.003			8 - 1/2 GAL	BIO-MONITORING

METHOD OF SHIPMENT (CIRCLE)	FIELD CALIBRATION RECORD	NOTES/COMMENTS/OBSERVATIONS
FED-EX WALK-IN <input checked="" type="radio"/> UPS OTHER	PH 7	Turned in Lab 7.5
	PH 4	
TYPE OF SAMPLE(S): (CIRCLE)	PH 10	
WATER SOIL <input checked="" type="radio"/> W/W SLUDGE OTHER	D. O.	
		FIELD ANALYSIS CONDUCTED BY: <input checked="" type="radio"/> SRA CLIENT

RELINQUISHED BY:	DATE/TIME	RECEIVED BY:	DATE/TIME
		<i>[Signature]</i>	1335 3-12-14
RELINQUISHED BY:	DATE/TIME	RECEIVED BY:	DATE/TIME
		<i>[Signature]</i>	1605 3-12-14

TURNAROUND TIME RUSH 24HR. 48HR. 5 DAY REG. OTHER:	FOR LAB/OFFICE USE ONLY LAB # <u>16936.0003B</u> CLIENT # <u>45023</u> P. O. # _____	STANDARD METHODS PRESERVATION PER EPA 40 CFR C 4 = COOL TO 4.0 C S < 2 = SULFURIC ACID TO PH < 2 N < 2 = NITRIC ACID TO PH > 2 T = THIOSULFATE W = AZIDE MODIFICATION (4600-0 C) P = MEMBRANE ELECTRODE (4600-0 G) NaOH = Ph > 12
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NAME OF COMPANY, CITY, OR PROJECT: \_\_\_\_\_ PROJECT NO: \_\_\_\_\_ SAMPLER(S) SIGNATURE/PRINT \_\_\_\_\_

WYNNE WATER UTILITIES

SAMPLE NO.	SAMPLE COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP/GRAB	FIELD ANALYSIS				D.O. (W)	CONTAINER TYPE	ANALYSIS REQUIRED
					PH	TEMP	FLOW	CL2			
	POST AERATION BASIN OUTFALL	3/13/14 7:00 AM	3/14/14 7:00 AM	COMP/24			0.9777			6 - 1/2 GAL	BIO-MONITORING

METHOD OF SHIPMENT (CIRCLE) FED-EX WALK-IN <u>SRA</u> UPS OTHER	FIELD CALIBRATION RECORD PH 7 PH 4 PH 10	NOTES/COMMENTS/OBSERVATIONS
TYPE OF SAMPLE(S): (CIRCLE) WATER SOIL <u>W/W</u> SLUDGE OTHER	D. O.	
FIELD ANALYSIS CONDUCTED BY <u>SRA</u> CLIENT		

RELINQUISHED BY: _____	DATE/TIME _____	RECEIVED BY: _____	DATE/TIME <u>3-14-14</u>
RELINQUISHED BY: _____	DATE/TIME _____	RECEIVED BY: _____	DATE/TIME <u>3-15-14</u>



# Bio-Aquatic Testing, Inc.



TCEQ TNI Accredited

**Sorrells Research Associates Inc  
City of Wynne**

**Client Address:  
8100 NATIONAL DRIVE  
LITTLE ROCK, AR 72209**

**Chronic Biomonitoring Report**

**56894**

*Ceriodaphnia dubia*  
*Pimephales promelas*

**March 11, 2014**

Approved by: Chi Robison

*Bio-Aquatic Testing, Inc. • 2501 Mayes Rd. Ste. 100 • Carrollton, Texas • 75006*

## TABLE OF CONTENTS

TOXICITY TEST REPORT	3
SURVIVAL TEST SUMMARY	6
STATISTICAL & CHEMICAL ANALYSIS	Appendix A
REFERENCE TOXICANTS	Appendix B
LITERATURE REFERENCES	Appendix C
CHAIN-OF-CUSTODY SHEETS	Appendix D
REGULATORY AGENCY TABLES	Appendix E

Unless otherwise noted in the body of the report, all data reported in this document are in compliance with current TNI standards and apply only to the samples referenced within. This report document may not be edited or reproduced in part or in full by any other entity, unless Bio-Aquatic Testing, Inc. issues written approval.

\*HAND-WRITTEN RAW DATA TABLES ARE AVAILABLE UPON REQUEST



**BIO-AQUATIC TESTING, INC.**

2501 Mayes Road, Suite 100

Carrollton, Texas 75006

Tel: (972) 242-7750

Fax: (972) 242-7749

**TOXICITY TEST REPORT - Chronic**

---

Client: Sorrells Research Associates Inc  
Facility: Wynne, City of  
Permit No. AR0021903

Sample:  
Laboratory Number: 56894  
Date: March 11, 2014

*Ceriodaphnia dubia* passed survival and reproduction testing requirements. *Pimephales promelas* passed survival and growth testing requirements.

---

**SAMPLE COLLECTION:** Composite effluent samples from Sorrells Research Associates Inc, City of Wynne, were received on March 11, 2014, March 13, 2014, and March 15, 2014. Effluent samples were collected by facility personnel.

The effluent samples were analyzed for total residual chlorine using the Hanna Ion Specific Meter #193711 and contained <0.10 mg/L, <0.10 mg/L, and <0.10 mg/L, respectively. Effluent and laboratory dilution water pH, temperature, and dissolved oxygen data were collected daily.

**TEST PROCEDURES:**  
*Ceriodaphnia dubia*

EPA METHOD: 1002

The seven-day (three brood) Chronic *Ceriodaphnia dubia* survival and reproduction test was initiated at 14:15 hours on March 11, 2014. Five effluent concentrations of 32%, 42%, 56%, 75% and 100% were prepared using synthetic water as dilution water. The test was set up with 30mL plastic cups containing 15mL of test solution or control dilution water. Each effluent concentration or control dilution water included ten replicate cups with one organism in each cup. The control was conducted concurrently with the test. Test organisms were less than 24-hour old laboratory cultured neonates. Neonates were introduced into the test solutions using a blocking design. The test was renewed daily with newly prepared solutions. Food consisting of a half-milliliter suspension of the green algae, *Selenastrum capricornutum*, and YTC was added to the test solutions each day. The test proceeded for seven days or until 60% of the females in the control had three broods. Data on survival and number of young produced per female were collected daily. The test ended at 11:10 hours on March 17, 2014. Survival and reproduction data were statistically ( $p=0.05$ ) analyzed according to EPA procedures to determine the Lowest Observable Effect Concentration (LOEC) and the No Observable Effect Concentration (NOEC).

#### SURVIVAL:

*Ceriodaphnia dubia*

Fisher's Exact test on *Ceriodaphnia dubia* survival test data demonstrated no statistically significant differences between the control and any of the effluent concentrations tested.

**LOEC: Not Calculable (Q)**

**NOEC: 100% Effluent**

#### REPRODUCTION:

*Ceriodaphnia dubia*

The *Ceriodaphnia dubia* reproduction data were normally distributed at the alpha level of 0.01 (13.277) using the Chi-square test for normality. Reproduction data were shown not to be homogeneous using Bartlett's test at the alpha level of 0.01 (15.09) without data transformations. Using ANOVA and Dunnett's or Steel's Many- One Rank Test or Wilcoxon Rank Sum Test (with Bonferroni adjustment as appropriate for Sub-Lethality) *Ceriodaphnia dubia* reproduction data demonstrated no statistically significant differences between the control and any of the effluent concentrations tested.

**LOEC: Not Calculable (Q)**

**NOEC: 100% Effluent**

#### TEST PROCEDURES:

*Pimephales promelas*

**EPA METHOD: 1000**

The seven-day Chronic *Pimephales promelas* survival and growth test was initiated at 15:30 hours on March 11, 2014. Five effluent concentrations of 32%, 42%, 56%, 75% and 100% were prepared using synthetic water as dilution water. The test was set up with 450mL plastic cups containing 250mL of test solution as test chambers. Each concentration consisted of five replicate chambers containing eight organisms each, giving a total of 40 (forty) per treatment. The control test was conducted concurrently with the test. Test organisms were laboratory-cultured *Pimephales promelas* larvae less than 24-hours old. The number of surviving larvae and water quality parameters in the old test solutions were recorded after each 24-hour period. The test was renewed daily with fresh solutions. Surviving larvae in each test chamber were fed freshly hatched brine shrimp two times per day. The test proceeded for seven days.

At the end of the test, all organisms were sacrificed, dried, and weighed. Data on surviving organisms and water quality were collected. The test ended at 10:00 hours on March 18, 2014. Survival and growth (weight) were statistically ( $p=0.05$ ) analyzed according to EPA procedures to determine the Lowest Observable Effect Concentration (LOEC) and the No Observable Effect Concentration (NOEC).

**SURVIVAL:**

*Pimephales promelas*

The non-parametric Steel's Many-One Rank test performed on *Pimephales promelas* survival data demonstrated no statistically significant differences between the control and any of the effluent concentrations tested.

**LOEC: Not Calculable (Q)**

**NOEC: 100% Effluent**

**GROWTH:**

*Pimephales promelas*

The *Pimephales promelas* growth data were normally distributed at the alpha level of 0.01 (0.900) using Shapiro Wilk's test for normality. Growth data were shown to be homogeneous using Bartlett's test at the alpha level of 0.01 (15.09) without data transformations. ANOVA and Dunnett's test on *Pimephales promelas* growth data demonstrated no statistically significant differences between the control and any of the effluent concentrations tested.

**LOEC: Not Calculable (Q)**

**NOEC: 100% Effluent**

# BIO-AQUATIC TESTING, INC.

## TOXICITY TEST

### Chronic *Ceriodaphnia dubia*

Client: Sorrells Research Associates Inc Wynne, City of

Lab ID: 56894

Permit Number: NPDES AR0021903

Test Temperature (oC): 25 ± 1

Sample Type: Composite

Photo Period: 16 hours light, 8 hours dark

Outfall Name:

Dilution Water: synthetic

Receiving Water Name:

Begin Date: 3/11/2014

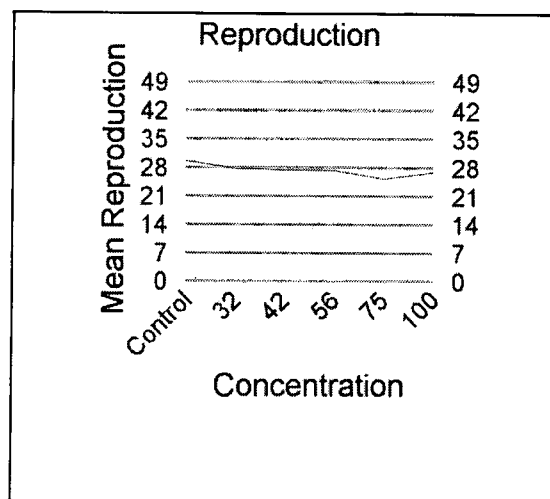
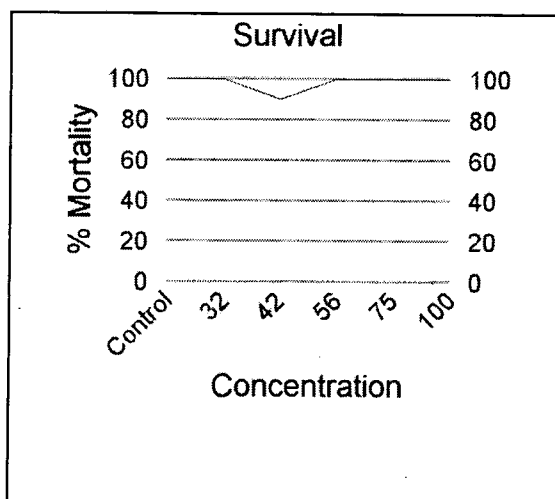
End Date: 3/17/2014

Test Start Time: 14:15 Test End Time: 11:10

### SURVIVAL AND REPRODUCTION TABLE

FEMALE #	Control	32 %	42 %	56 %	75 %	100 %
1	30	33	31	31	28	31
2	33	34	25	36	28	26
3	30	18	18	20	16	24
4	34	26	12	16	16	27
5	29	24	34	34	27	26
6	29	32	32	27	24	32
7	21	28	30	31	28	28
8	30	28	32	24	32	22
9	28	30	34	33	24	25
10	33	26	D-4	22	31	28
Mean	29.7	27.9	27.5	27.4	25.4	26.9
C.V%	12.2	17.1	28.1	24.3	21.8	11.2
Var	13.344	22.766	60.027	44.488	30.933	9.211
Std.Dev.	3.653	4.771	7.747	6.669	5.561	3.034
Max	34	34	34	36	32	32
Min	21	18	12	16	16	22

### Concentration Response Relationships



# BIO-AQUATIC TESTING, INC.

Control

## Survival and Reproduction

32

Date	1	2	3	4	5	6	7	8	9	10
3/12	A	A	A	A	A	A	A	A	A	A
3/13	A	A	A	A	A	A	A	A	A	A
3/14	5	A	A	A	5	A	A	A	A	5
3/15	A	7	7	4	A	7	A	6	6	A
3/16	11	11	10	14	12	9	9	14	8	12
3/17	14	15	13	16	12	13	12	10	14	16
	30	33	30	34	29	29	21	30	28	33
3/18										
3/19										

**Mean:** 29.70      **CV%** 12.20  
**Var.** 13.34      **Max** 34  
**Std.Dev.** 3.65      **Min** 21

Date	1	2	3	4	5	6	7	8	9	10
3/12	A	A	A	A	A	A	A	A	A	A
3/13	A	A	A	A	A	A	A	A	A	A
3/14	4	A	A	A	A	A	A	A	A	5
3/15	A	6	6	6	A	5	6	6	6	A
3/16	11	12	12	8	12	13	8	10	8	7
3/17	18	16	A	12	12	14	14	12	16	14
	33	34	18	26	24	32	28	28	30	26
3/18										
3/19										

**Mean:** 27.90      **CV%** 17.10  
**Var.** 22.77      **Max** 34  
**Std.Dev.** 4.77      **Min** 18

E= spilled cup

42

56

Date	1	2	3	4	5	6	7	8	9	10
3/12	A	A	A	A	A	A	A	A	A	A
3/13	A	A	A	A	A	A	A	A	A	A
3/14	5	A	A	A	A	A	A	A	A	4
3/15	A	7	6	6	5	6	6	6	6	D
3/16	10	8	12	6	11	8	6	8	10	D
3/17	16	10	A	A	18	18	18	18	18	D
	31	25	18	12	34	32	30	32	34	4
3/18										
3/19										

**Mean:** 27.50      **CV%** 28.10  
**Var.** 60.03      **Max** 34  
**Std.Dev.** 7.75      **Min** 12

Date	1	2	3	4	5	6	7	8	9	10
3/12	A	A	A	A	A	A	A	A	A	A
3/13	A	A	A	A	A	A	A	A	A	A
3/14	5	A	A	A	A	A	A	A	A	4
3/15	A	8	7	7	6	7	6	6	6	A
3/16	12	10	13	9	10	9	6	8	9	6
3/17	14	18	A	A	18	11	19	10	18	12
	31	36	20	16	34	27	31	24	33	22
3/18										
3/19										

**Mean:** 27.40      **CV%** 24.30  
**Var.** 44.49      **Max** 36  
**Std.Dev.** 6.67      **Min** 16

75

100

Date	1	2	3	4	5	6	7	8	9	10
3/12	A	A	A	A	A	A	A	A	A	A
3/13	A	A	A	A	A	A	A	A	A	A
3/14	4	A	A	A	A	A	A	A	A	4
3/15	A	6	7	7	6	6	7	6	6	A
3/16	10	12	9	9	11	8	11	8	6	8
3/17	14	10	A	A	10	10	10	18	12	19
	28	28	16	16	27	24	28	32	24	31
3/18										
3/19										

**Mean:** 25.40      **CV%** 21.80  
**Var.** 30.93      **Max** 32  
**Std.Dev.** 5.56      **Min** 16

Date	1	2	3	4	5	6	7	8	9	10
3/12	A	A	A	A	A	A	A	A	A	A
3/13	A	A	A	A	A	A	A	A	A	A
3/14	5	A	A	A	4	A	A	4	A	5
3/15	A	7	6	7	A	6	6	A	6	A
3/16	10	9	8	8	10	8	10	8	9	11
3/17	16	10	10	12	12	18	12	10	10	12
	31	26	24	27	26	32	28	22	25	28
3/18										
3/19										

**Mean:** 26.90      **CV%** 11.20  
**Var.** 9.21      **Max** 32  
**Std.Dev.** 3.03      **Min** 22

BIO-AQUATIC TESTING, INC.

Chronic CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION

Client: Sorrells Research Associates - Wynne, City of

Lab ID: 56894

Culture No.: B2030414-B

TEST INSTRUCTIONS:

[Empty box for test instructions]

ORGANISMS ADDED:

Date: 3-11-14

Time: 1415

Technician:

B<sup>3</sup>

Photo Period 16hr Light/8hr dark

Dilution: Control

RANDOMIZATION:

SC-10 28

DATE/TIME/TECHNICIAN	1	2	3	4	5	6	7	8	9	10
241hr 3-12-14 BA 16380	A									A
481hr 3-13-14 DA 11109	A									A
721hr 3-14-14 JA 0900	5	A	A	A	5	A			A	5
961hr 3-15-14 JA 1310	A	7	7	4	A	7	A	6	6	A
5 days 3-16-14 SC 1015	11	11	10	14	12	9	9	14	8	12
6 days 3-17-14 SC 1110	14	15	13	16	12	13	12	10	14	16
7 days										
8 days										

Dilution: 32 %

	1	2	3	4	5	6	7	8	9	10
241hr	A									A
481hr	A									A
721hr	4	A							A	5
961hr	A	6	6	6	A	5	6	6	6	A
5 days	11	12	12	8	12	13	8	10	8	7
6 days	18	16	A	12	12	14	14	12	16	14
7 days										
8 days										

Code: Cells in numbers columns indicate daily survival and reproduction. "A" means adult alive and no young produced, a number means adult alive and that number of young produced. "D" followed by a zero means adult dead and no young produced. "D" followed by a number means adult dead and that number of young produced. "E" indicates loss out due to experimental error. Lined through spaces preceded by a number or letter represent the same number. Lined spaces without a preceding number or letter indicate unusable or not applicable spaces.

BIO-AQUATIC TESTING, INC.

Chronic CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION

Client: Sorrells Research Associates - Wynne, City of

Lab ID: 56894 Culture No.:

TEST INSTRUCTIONS:

[Empty box for test instructions]

Dilution: 42 %

	1	2	3	4	5	6	7	8	9	10
24Hr	A									A
48Hr	A									A
72Hr	5	A							A	4
96Hr	A	7	6	6	5	6	6	6	6	D
5 days	10	8	12	6	11	8	10	8	10	1
6 days	16	10	A	A	18	18	18	18	18	
7 days										
8 days										

Dilution: 56 %

	1	2	3	4	5	6	7	8	9	10
24Hr	A									A
48Hr	A									A
72Hr	5	A							A	4
96Hr	A	8	7	7	6	7	6	6	6	A
5 days	12	10	13	9	10	9	10	8	9	6
6 days	14	18	A	A	18	11	9	10	18	12
7 days										
8 days										

Code: Cells in numbered columns indicate daily survival and reproduction. "A" means adult alive and no young produced, a number means adult alive and that number of young produced, "D" followed by a zero means adult dead and no young produced, "D" followed by a number means adult dead and that number of young produced, "E" indicates loss out due to experimenter error. Lines through spaces preceded by a number or letter represent the same number or letter without a preceding number or letter indicate unused or not applicable spaces.

BIO-AQUATIC TESTING, INC.

Chronic CERIODAPHNIA DUBIA

SURVIVAL AND REPRODUCTION

Client: Sorrells Research Associates - Wynne, City of

Lab ID: 56894

Culture No.:

TEST INSTRUCTIONS:

[Empty box for test instructions]

Dilution: 75 %

	1	2	3	4	5	6	7	8	9	10
24Hr	A									A
48Hr	A									A
72Hr	4	A							A	4
96Hr	A	6	7	7	6	6	7	6	6	A
5 days	10	12	8	9	11	8	11	8	6	7
6 days	14	10	A	A	10	10	10	8	12	13
7 days										
8 days										

Dilution: 100 %

	1	2	3	4	5	6	7	8	9	10
24Hr	A									A
48Hr	A									A
72Hr	5	A	A	A	4	1	A	4	1	5
96Hr	A	7	6	7	A	6	6	A	6	A
5 days	10	9	8	8	10	8	10	8	9	11
6 days	16	10	10	12	12	18	12	10	10	12
7 days										
8 days										

Code: Cells in numbered columns indicate daily survival and reproduction. "A" means adult alive and no young produced; a number means adult alive and that number of young produced; "0" followed by a zero means adult dead and no young produced; "D" followed by a number means adult dead and that number of young produced; "E" indicates loss due to experimenter error. Lined through spaces (preceded by a number or letter) represent the same number or letter indicates censored or not applicable spaces.



BIO-AQUATIC TESTING, INC.

Chronic CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION

Client: Sorrells Research Associates - Wynne, City of

Lab ID: 56894

Culture No.:

TEST INSTRUCTIONS:

[Empty box for test instructions]

Test Temperatures

	0Hr	24Hr		48Hr		72Hr		96Hr		5 days		6 days		7 days
	new	old / new		old / new		old / new		old / new		old / new		old / new		old
Control	26.0	25.7	24.1	24.0	25	24.4	24	24.1	24.8	27.2	27.1	27.2	27.0	
32		25.5	24.6	24.5	25.5		24.2		25.0				27.1	
42													27.0	
56													27.2	
75														
100														
TIME/DATE TECH	3-11-14 141560	3-16-14 0300 00		3-18-14 0410 00		3-14-14 11 0705		3-15-14 11 1315		3-16-14 02 1015		3-17-14 02 1110		11/1 056
IR GUN ID #	006	006		006		006		006		006		006		
SAMPLE # @ RENEWAL	1	1		1		2		2		3		3		

Lined through spaces preceded by a number represent the same number. Lined spaces without a preceding number indicate unused or not applicable spaces.

**Chronic *Pimephales promelas***

Client: Sorrells Research Associates Inc Wynne, City of

Lab ID: 56894

Permit Number: NPDES AR0021903

Test Temperature (oC): 25 ± 1

Outfall Name: Sample Type: Composite

Photo Period: 16 Hours Light  
8 Hours Dark

Receiving Water Name:

Test Start Time: 15:30

Test End Time: 10:00

Begin Date: 3/11/2014

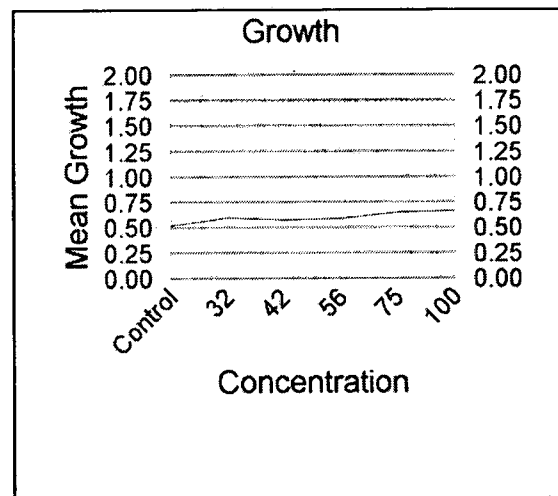
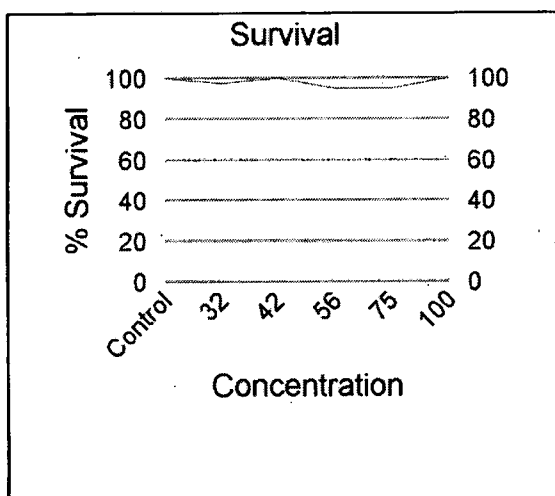
End Date: 3/18/2014

**SURVIVAL**

Effluent Concentration	Number Of Alive								Avg% Surv.	
	3/11	3/12	3/13	3/14	3/15	3/16	3/17	3/18		
Control	A	8	8	8	8	8	8	8	8	100.0%
	B	8	8	8	8	8	8	8	8	
	C	8	8	8	8	8	8	8	8	
	D	8	8	8	8	8	8	8	8	
	E	8	8	8	8	8	8	8	8	
32	A	8	8	8	8	8	8	8	8	97.5%
	B	8	8	8	8	8	8	8	8	
	C	8	8	8	8	7	7	7	7	
	D	8	8	8	8	8	8	8	8	
	E	8	8	8	8	8	8	8	8	
42	A	8	8	8	8	8	8	8	8	100.0%
	B	8	8	8	8	8	8	8	8	
	C	8	8	8	8	8	8	8	8	
	D	8	8	8	8	8	8	8	8	
	E	8	8	8	8	8	8	8	8	
56	A	8	8	8	8	8	8	8	8	95.0%
	B	8	8	8	8	8	8	8	8	
	C	8	8	8	8	8	8	8	8	
	D	8	8	8	8	7	7	7	6	
	E	8	8	8	8	8	8	8	8	

Effluent Concentration	Number Of Alive								Avg% Surv.
	3/11	3/12	3/13	3/14	3/15	3/16	3/17	3/18	
75	A	8	8	8	8	8	8	8	95.0%
	B	8	8	8	8	8	8	8	
	C	8	8	8	8	8	8	7	
	D	8	8	8	8	7	7	7	
	E	8	8	8	8	8	8	8	
100	A	8	8	8	8	8	8	8	100.0%
	B	8	8	8	8	8	8	8	
	C	8	8	8	8	8	8	8	
	D	8	8	8	8	8	8	8	
	E	8	8	8	8	8	8	8	
	A								
	B								
	C								
	D								
	E								

**Concentration Response Relationships**



BIO-AQUATIC TESTING, INC.

Chronic Pinephales promelas SURVIVAL Lab ID: 56894

Client: Sorrells Research Associates Inc Facility: Wyone, City of Outfall: Sample Type: Composite

TEST INSTRUCTIONS: [Empty Box]

Culture No.: PI-14-004 Photo Period: 16hr light, 8hr dark RANDOMIZATION: SC-5 1

Dilution: Control		32					42					56									
DATE/TIME/TECHNICIAN	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	
0Hr 3-11-14 J 1530	8					8					8					8					
24Hr 3-12-14 SC 1030	8					8					8					8					
48Hr 3-13-14 RL 1130	8					8					8					8					
72Hr 3-14-14 1130	8					7					8					8					
96Hr 3-15-14 1125	8					8	7	7	7	7	7					8			7	7	
5 days 3-16-14 2 130	8					8	8	7	8	8	8					8			7	8	
6 days 3-17-14 AB 1055	8					8	8	7	8	8	8					8			7	8	
7 days 3-18-14 AB 002	8					8	8	7	8	8	8					8			10	8	

Dilution: 75		100																			
DATE/TIME/TECHNICIAN	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	
0Hr	8					8															
24Hr	8					8															
48Hr	8					8															
72Hr	8					8															
96Hr	8			7	7	8															
5 days	8			7	8	8															
6 days	8			7	8	8															
7 days	8	8	7	7	8	8															

Lined through spaces preceded by a number represent the same number. Lined spaces without a preceding number indicate unused or not applicable spaces.

BIO-AQUATIC TESTING, INC.

Chronic Pimephales promelas SURVIVAL Lab ID: 56894

Client: Sorrells Research Associates Inc Facility Wynne, City of Outfall: Sample Type Composite

TEST INSTRUCTIONS:

Test Temperatures

	0Hr	24Hr	48Hr	72Hr	96Hr	5 days	6 days	7 days
	new	old / new	old / new	old / new	old / new	old / new	old / new	old
Control	25.1 ✓	25.1 ✓	25.2 ✓	25.3 ✓	25.2 ✓	25.1 ✓	25.4 ✓	25.4 ✓
32	✓	25.2 ✓	25.1 ✓	25.2 ✓	25.1 ✓	25.2 ✓	25.2 ✓	✓
42	25.1 ✓	✓	25.2 ✓	✓	✓	25.2 ✓	✓	✓
56	✓	✓	✓	25.2 ✓	✓	✓	✓	✓
75	✓	✓	✓	25.1 ✓	✓	✓	✓	✓
100	✓	✓	✓	25.2 ✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓	✓	✓
	✓	✓	✓	✓	✓	✓	✓	✓
TIME/DATE TECH	3-11-14 J 1530	3-12-14 SL 1030	3-13-14 SL 1130	3-14-14 112	3-15-14 112	3-16-14 2 1320	3-17-14 AB 1155	3-18-14 AB 1020
IR GUN ID #	004	004	004	004	004	004	004	004
SAMPLE # & RENEWAL	1	1	1	2	2	3	3	

Lined through spaces preceded by a number represent the same number. Lined spaces without a preceding number indicate unused or not applicable spaces.

Chronic *Pimephales promelas*

Client: Sorrells Research Associates Inc Wynne, City of

Lab ID: 56894

Permit Number: AR0021903

Begin Date: 3/11/2014

Sample Type: Composite

Outfall Name:

Receiving Water Name:

End Date: 3/18/2014

Synthetic

	ON	SN	Wt.	Avg.	SN Avg.
A	8	8	3.977	0.497	0.497
B	8	8	4.294	0.537	0.537
C	8	8	4.250	0.531	0.531
D	8	8	4.285	0.536	0.536
E	8	8	4.070	0.509	0.509

Mean	C.V. %
0.522	3.4

SN Mean	SN C.V. %
0.522	3.4

	ON	Wt.	Avg.
A	8	4.387	0.548
B	8	4.835	0.604
C	8	4.601	0.575
D	8	5.374	0.672
E	8	4.714	0.589

Mean	C.V. %
0.598	7.7

	ON	Wt.	Avg.
A	8	4.968	0.621
B	8	4.013	0.502
C	8	4.572	0.572
D	8	4.394	0.549
E	8	5.205	0.651

Mean	C.V. %
0.579	10.2

	ON	Wt.	Avg.
A	8	5.152	0.644
B	8	4.904	0.613
C	8	5.026	0.628
D	8	4.024	0.503
E	8	4.482	0.560

Mean	C.V. %
0.590	9.8

75

	ON	Wt.	Avg.
A	8	5.369	0.671
B	8	5.602	0.700
C	8	5.272	0.659
D	8	4.741	0.593
E	8	5.105	0.638

Mean	C.V. %
0.652	6.2

100

	ON	Wt.	Avg.
A	8	5.252	0.657
B	8	5.343	0.668
C	8	5.539	0.692
D	8	5.132	0.642
E	8	5.375	0.672

Mean	C.V. %
0.666	2.8

	ON	Wt.	Avg.
A			
B			
C			
D			
E			

Mean	C.V. %

	ON	Wt.	Avg.
A			
B			
C			
D			
E			

Mean	C.V. %

Note: ON stands for original number per replicate, while SN refers to the number surviving after test completion.

BIO-AQUATIC TESTING, INC.

Chronic

Pimephales promelas

TOXICITY TEST

Client: Sorrells Research Associates Inc - Wynne, City of

Lab ID: 56894

Begin Date: 3/11/2014

End Date: 3/18/2014

Organism: Pimephales promelas

Balance: Sartorius MP3

Analyst: JV

Date/Time placed in Oven: 3-18-14 1720

Weigh Date: 3-26-14

Date/Time removed from Oven: 3-19-14 1720

Control

	Qty.	Wt.
A	8	3.917
B	8	4.294
C	8	4.250
D	8	4.285
E	8	4.070

32 %

	Qty.	Wt.
A	8	4.387
B	8	4.835
C	7	4.601
D	8	5.379
E	8	4.714

42 %

	Qty.	Wt.
A	8	4.968
B	8	4.013
C	8	4.572
D	8	4.394
E	8	5.205

56 %

	Qty.	Wt.
A	8	5.152
B	8	4.904
C	8	5.026
D	6	4.024
E	8	4.482

75 %

	Qty.	Wt.
A	8	5.364
B	8	5.402
C	7	5.272
D	7	4.741
E	8	5.105

100 %

	Qty.	Wt.
A	8	5.252
B	8	5.343
C	8	5.539
D	8	5.132
E	8	5.375

	Qty.	Wt.
A		
B		
C		
D		
E		

	Qty.	Wt.
A		
B		
C		
D		
E		

Lined through spaces preceded by a number represent the same number. Lined spaces without a preceding number indicate unused or not applicable spaces.

## APPENDIX A

### STATISTICS SUMMARY

Both the lethal and sub-lethal endpoints were statistically calculated according to their respective EPA guidelines. The Chronic Freshwater organisms were calculated according to EPA-821-R-02-013, October 2002 Fourth Edition. The Chronic Marine and Estuarine organisms were calculated according to EPA-821-R-02-014, October 2002 Third Edition. The Acute Freshwater and Marine organisms were calculated according to EPA-821-R-02-012, October 2002 Fifth Edition. Listed below are the basic principles of these guidelines. If you would like a copy of the raw statistical calculations for your test then please contact us.

The chronic and acute *Pimephales promelas* and *Menidia beryllina* survival data is analyzed using Shipiro Wilks Test and Bartlett's Test. If the data passes both tests then the data is run through ANOVA and Dunnetts (parametric). If the data fails Shipiro Wilks Test or Bartlett's Test then Steels Many One Test (non-parametric) is used. The chronic *Pimephales promelas* and *Menidia beryllina* growth data is analyzed using Shipiro Wilks Test and Bartlett's Test. If the data passes one of these tests then the data is run through ANOVA and Dunnetts. If the data fails Shipiro Wilks Test and Bartlett's Test then Steels Many One Test is used.

The chronic *Mysidopsis bahia* survival data is analyzed using Chi-square test and Bartlett's Test. If the data passes both tests then the data is run through ANOVA and Dunnetts. If the data fails Chi-square test or Bartlett's Test then Steels Many One Test is used. *Mysidopsis bahia* growth data is analyzed using Chi-square test and Bartlett's Test. If the data passes one of these tests then the data is run through ANOVA and Dunnetts. If the data fails Chi-square test and Bartlett's Test then Steels Many One Test is used.

The acute *Mysidopsis bahia* survival data is analyzed using Shipiro Wilks Test and Bartlett's Test. If the data passes both tests then the data is run through ANOVA and Dunnetts. If the data fails Shipiro Wilks Test or Bartlett's Test then Steels Many One Test is used.

The chronic *Ceriodaphnia dubia* survival data are analyzed using the Fisher's Exact Test. The chronic *Ceriodaphnia dubia* reproduction and are analyzed using the Chi-square test and Bartlett Test. If the data passes one of these tests then the data is run through ANOVA and Dunnetts. If the data fails Chi-square test and Bartlett's Test then Steels Many One Test is used.

The acute *Daphnia pulex* and *Ceriodaphnia dubia* survival data is analyzed using Shipiro Wilks Test and Bartlett's Test. If the data passes both tests then the data is run through ANOVA and Dunnetts. If the data fails Shipiro Wilks Test or Bartlett's Test then Steels Many One Test is used.



56894

cerio  
File: 56894.cdr Transform: NO TRANSFORMATION

Chi-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.020	14.520	22.920	14.520	4.020
OBSERVED	7	8	25	19	1

Calculated Chi-Square goodness of fit test statistic = 8.9765  
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

cerio  
File: 56894.cdr Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance  
Calculated B1 statistic = 17.37

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.

cerio  
File: 56894.cdr Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	140.283	28.057	0.733
Within (Error)	54	2066.300	38.265	
Total	59	2206.583		

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

cerio  
File: 56894.cdr 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	con	29.700	29.700		

			56894		
2	32	27.900		27.900	0.651
3	42	25.200		25.200	1.627
4	56	27.400		27.400	0.831
5	75	25.400		25.400	1.554
6	100	26.900		26.900	1.012

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

cerio  
File: 56894.cdr 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	con	10			
2	32	10	6.390	21.5	1.800
3	42	10	6.390	21.5	4.500
4	56	10	6.390	21.5	2.300
5	75	10	6.390	21.5	4.300
6	100	10	6.390	21.5	2.800

cerio  
File: 56894.cdr Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	con	29.700				
2	32	27.900	91.00	75.00	10.00	
3	42	25.200	101.50	75.00	10.00	
4	56	27.400	99.50	75.00	10.00	
5	75	25.400	76.50	75.00	10.00	
6	100	26.900	78.00	75.00	10.00	

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

fathead growth  
File: 56894.ppg Transform: NO TRANSFORMATION

Shapiro - wilk's test for normality

D = 0.045

W = 0.980

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.

56894

fathead growth  
File: 56894.ppg Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance  
Calculated B1 statistic = 8.27

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.

fathead growth  
File: 56894.ppg Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.069	0.014	7.350
Within (Error)	24	0.045	0.002	
Total	29	0.114		

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

fathead growth  
File: 56894.ppg 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	con	0.522	0.522		
2	32	0.598	0.598	-2.765	
3	42	0.579	0.579	-2.084	
4	56	0.590	0.590	-2.472	
5	75	0.652	0.652	-4.761	
6	100	0.666	0.666	-5.273	

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

fathead growth  
File: 56894.ppg 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	con	5			

			56894		
2	32	5	0.065	12.4	-0.076
3	42	5	0.065	12.4	-0.057
4	56	5	0.065	12.4	-0.068
5	75	5	0.065	12.4	-0.130
6	100	5	0.065	12.4	-0.144

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56894

**Bio-Aquatic Testing, Inc.**

2501 Mayes Road, Suite 100  
Carrollton, TX 75006  
Tel: 972-242-7750  
Fax: 972-242-7749

**FRESH WATER TEST SETUP FORM**

Client: Sorrells Research Associates Inc

Permit AR0021903

Facility: Wynne, City of

Lab Number 56894

Outfall Name: \_\_\_\_\_

Number of samples 3

Dilution Water: Synthetic Lab

Receiving Water Name: \_\_\_\_\_

Dechlorinate Sample: No

Sx #	Rcvd Date	Rcvd Time	Sampling Dates		Sampling Times	
			Begin Date	End Date	Start	End
1	03/11/14	11:55	03/09/14	03/10/14	07:00	07:00
2	03/13/14	09:15	03/11/14	03/12/14	07:00	07:00
3	03/15/14	15:30	03/13/14	03/14/14	07:00	07:00

Type of Test(s)	
<u>Ceriodaphnia dubia</u>	<u>Chronic</u>
<u>Pimephales promelas</u>	<u>Chronic</u>

- Start Sx # 1 Date: 3/11/2014
- Renew Sx # 1 Date: 3/12/2014
- Renew Sx # 1 Date: 3/13/2014
- Renew Sx # 2 Date: 3/14/2014
- Renew Sx # 2 Date: 3/15/2014
- Renew Sx # 3 Date: 3/16/2014
- Renew Sx # 3 Date: 3/17/2014

Controls: Synthetic

pH Match: \_\_\_\_\_

Hardness Match: \_\_\_\_\_

Test Start Date: 3/11/2014 Test End Date: 3/18/2014

Ceriodaphnia dubia Test Set Up: 10 Reps & 1 Organisms per Rep

Pimephales Test Set Up: 5 Reps & 8 Organism per Rep

Concentrations: 32 42 56 75 100 % LF % 100

Test Chemistry on these dilutions: 32 42 56 75 100

Samples received by:

<input type="radio"/> Greyhound	<input type="radio"/> UPS Next Day	<input type="radio"/> Delta Dash	<input type="radio"/> Delta
<input type="radio"/> Pony Express	<input type="radio"/> Client Delivered	<input type="radio"/> Southwest Airlines	<input type="radio"/> DHL
<input checked="" type="radio"/> Federal Express	<input type="radio"/> American Airlines	<input type="radio"/> Bio Pick Up	

Other: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

# BIO-AQUATIC TESTING, INC.

Hardness, Alkalinity, Residual Chlorine, Specific Conductivity, and Salinity Analysis Data

**Client:** Sorrells Research Associates Inc

**Lab ID:** 56894

**Facility:** Wynne, City of

**Outfall:**

**Dilution Water(s):** Synthetic Lab

**Test Date:** March 11, 2014

\*\* 100 %

Effluent Sample #	Received		** Residual Cl <sub>2</sub>	DeChlor (ml/L)	** Ammonia mg/L	Analyst Initials	Initial Salinity	Adjusted Salinity	Temp. Received
	Date	Time							
1	3/11/14	11:55	<0.10	N/A	<0.25	JR	N/A	N/A	4.3
2	3/13/14	9:15	<0.10	N/A	<0.25	DF	N/A	N/A	3.6
3	3/15/14	15:30	<0.10	N/A	<0.25	JL	N/A	N/A	3.5

**Chlorine Analysis Method:** Hanna Ion Specific Meter #193711      **Dechlorination Reagent:** 0.025 N Sodium Thiosulfate

Sample #	Received		Hardness (EDTA) As mg/L CaCO <sub>3</sub>		ALKALINITY TO END POINT pH 4.50 +/- 0.05 as mg/L CaCO <sub>3</sub>		Analyst Initials
	Date	Time	CON	100	CON	100	
	1	3/11/14	11:55	130.0	82.0	55.0	
2	3/13/14	9:15	135.0	106.0	55.0	48.0	JV
3	3/15/14	15:30	135.0	114.0	55.0	38.0	JV

Date	Sample #	Values are at Highest Dilution		Values are at 100% Dilution		Analyst	Other	
		Specific Conductivity as umhos/cm	Salinity (ppt)	Residual Chlorine as mg Cl <sub>2</sub> /L	1 ml 0.02N Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> /L			
3/11	Lab H2O	599	0.3			JR		
3/12	Lab H2O	442	0.3			JH		
3/13	Lab H2O	459	0.3			JH		
3/14	Lab H2O	494	0.3			DP		
3/15	Lab H2O	499	0.3			TAH		
3/16	Lab H2O	513	0.3			TAH		
3/17	Lab H2O	567	0.3			AMC		
3/11	OUTFALL*	1	363	0.2	<0.10	N/A	JR	
3/12	OUTFALL*	1	354	0.2	<0.10	N/A	JH	
3/13	OUTFALL*	1	356	0.2	<0.10	N/A	JH	
3/14	OUTFALL*	2	505	0.3	<0.10	N/A	DP	
3/15	OUTFALL*	2	514	0.3	<0.10	N/A	TAH	
3/16	OUTFALL*	3	619	0.3	<0.10	N/A	TAH	
3/17	OUTFALL*	3	613	0.3	<0.10	N/A	AMC	

\*Conductivity is taken on the highest remaining effluent concentration used for test renewal, not necessarily 100%

# BIO-AQUATIC TESTING, INC.

pH, Dissolved Oxygen

Chronic

Ceriodaphnia dubia

Client: Sorrells Research Associates Inc

Lab ID: 56894

Facility: Wynne, City of

Dilution Water(s): Synthetic Lab

Outfall:

Test Begin Date: March 11, 2014

NR indicates that the test is non-renewal.

ANALYST	DATE	TIME	SX#	UNIT	Concentration							
					Control	32	42	56	75	100		
JR	3/11	Start	1	pH	7.6	7.6	7.4	7.4	7.2	7.2		
		25 ± 1		DO (mg/L)	8.8	8.5	8.6	8.6	8.7	8.8		
JH	3/12	24 Hr	1	pH	7.6	7.5	7.5	7.5	7.4	7.4		
		25 ± 1		DO (mg/L)	7.8	7.7	7.7	7.7	7.8	7.8		
JH	3/13	48 Hr	1	pH	7.7	7.7	7.6	7.6	7.5	7.5		
		25 ± 1		DO (mg/L)	8.2	8.2	8.2	8.2	8.2	8.2		
JH	3/13	Renew	1	pH	7.7	7.6	7.5	7.5	7.3	7.3		
				DO (mg/L)	8.1	8.1	8.3	8.3	8.4	8.4		
DP	3/14	72 Hr	1	pH	7.9	7.8	7.8	7.7	7.7	7.6		
		25 ± 1		DO (mg/L)	8.4	8.4	8.4	8.4	8.4	8.3		
DP	3/14	Renew	2	pH	7.9	7.8	7.8	7.6	7.6	7.2		
				DO (mg/L)	7.6	7.4	7.4	7.8	7.8	8.3		
TAH	3/15	96 Hr	2	pH	7.8	7.7	7.7	7.6	7.6	7.4		
		25 ± 1		DO (mg/L)	7.3	7.6	7.6	7.6	7.6	7.8		
TAH	3/16	Renew	2	pH	7.7	7.7	7.7	7.6	7.6	7.2		
				DO (mg/L)	7.2	8.1	8.1	8.6	8.6	9.0		
TAH	3/16	120 Hr	2	pH	7.3	7.5	7.5	7.5	7.5	7.4		
		25 ± 1		DO (mg/L)	7.7	7.6	7.6	7.5	7.5	7.5		
TAH	3/16	Renew	3	pH	7.7	7.6	7.4	7.2	7.1	7.0		
				DO (mg/L)	7.8	7.8	8.1	8.4	8.5	8.7		
DP	3/17	144 Hr	3	pH	7.8	7.7	7.7	7.6	7.6	7.6		
		25 ± 1		DO (mg/L)	7.9	7.9	7.9	7.9	7.9	7.9		
DP	3/17	Renew	3	pH	7.8	7.6	7.6	7.5	7.5	7.2		
				DO (mg/L)	8.2	8.2	8.3	8.5	8.6	8.8		
AMC	3/18	168 Hr	3	pH								
		25 ± 1		DO (mg/L)								

# BIO-AQUATIC TESTING, INC.

pH, Dissolved Oxygen

Chronic

Pimephales promelas

Client: Sorrells Research Associates Inc

Lab Number: 56894

Facility: Wynne, City of

Dilution Water(s): Synthetic Lab

Outfall:

Test Begin Date: March 11, 2014

NR indicates that the test is non-renewal.

ANALYST	DATE	TIME	SX#	UNIT	Concentration							
					Control	32	42	56	75	100		
JR	3/11	Start	1	pH	7.6	7.6	7.4	7.4	7.2	7.2		
		25 ± 1		DO (mg/L)	8.8	8.5	8.6	8.6	8.7	8.8		
JH	3/12	24 Hr	1	pH	7.8	7.7	7.7	7.7	7.6	7.6		
		25 ± 1		DO (mg/L)	8.7	8.6	8.6	8.5	8.4	8.4		
JH	3/13	Renew	1	pH	7.9	7.8	7.8	7.7	7.7	7.5		
		25 ± 1		DO (mg/L)	8.9	8.7	8.7	8.6	8.6	8.7		
JH	3/13	48 Hr	1	pH	7.3	7.3	7.2	7.2	7.3	7.3		
		25 ± 1		DO (mg/L)	8.0	7.9	7.8	7.8	7.7	7.7		
JH	3/13	Renew	1	pH	7.7	7.6	7.5	7.5	7.3	7.3		
		25 ± 1		DO (mg/L)	8.1	8.1	8.3	8.3	8.4	8.4		
DP	3/14	72 Hr	1	pH	7.5	7.5	7.5	7.3	7.3	7.2		
		25 ± 1		DO (mg/L)	9.1	8.7	8.7	8.1	8.1	7.7		
DP	3/14	Renew	2	pH	7.9	7.8	7.8	7.6	7.6	7.2		
		25 ± 1		DO (mg/L)	7.6	7.4	7.4	7.8	7.8	8.3		
TAH	3/15	96 Hr	2	pH	7.7	7.6	7.6	7.5	7.5	7.3		
		25 ± 1		DO (mg/L)	7.4	7.3	7.3	7.2	7.2	6.9		
TAH	3/15	Renew	2	pH	7.7	7.7	7.7	7.6	7.6	7.2		
		25 ± 1		DO (mg/L)	7.2	8.1	8.1	8.6	8.6	9.0		
TAH	3/16	120 Hr	2	pH	7.2	7.4	7.4	7.4	7.4	7.3		
		25 ± 1		DO (mg/L)	8.6	8.4	8.2	8.1	8.0	7.9		
TAH	3/16	Renew	3	pH	7.7	7.6	7.4	7.2	7.1	7.0		
		25 ± 1		DO (mg/L)	7.8	7.8	8.1	8.4	8.5	8.7		
DP	3/17	144 Hr	3	pH	7.5	7.5	7.5	7.5	7.5	7.4		
		25 ± 1		DO (mg/L)	8.7	8.6	8.5	8.4	8.4	8.4		
DP	3/17	Renew	3	pH	7.8	7.6	7.6	7.5	7.5	7.2		
		25 ± 1		DO (mg/L)	8.2	8.2	8.3	8.5	8.6	8.8		
AMC	3/18	168 Hr	3	pH	7.5	7.5	7.4	7.4	7.3	7.2		
		25 ± 1		DO (mg/L)	8.3	8.2	8.2	8.2	8.2	8.2		



# Appendix B

*Ceriodaphnia dubia*

## BIO-AQUATIC TESTING, INC.

Carrollton, TX

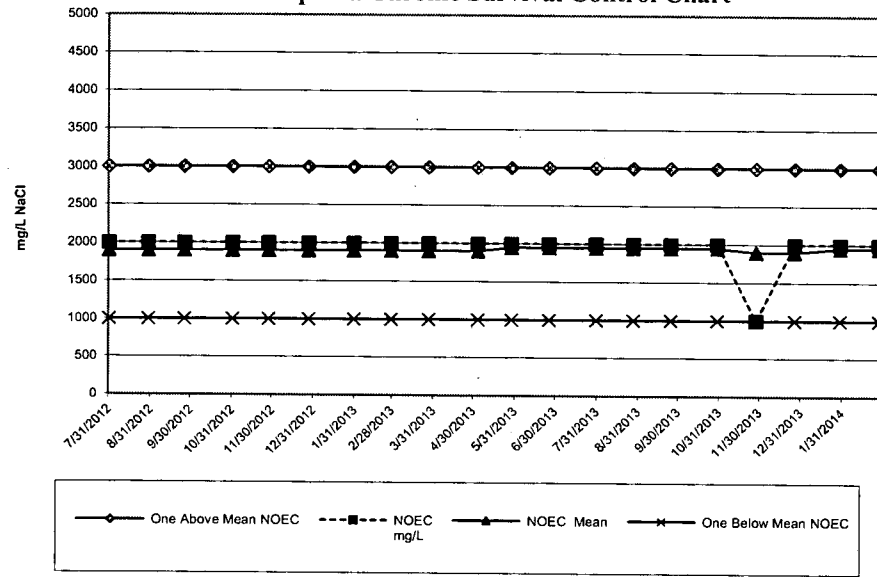
### REFERENCE TOXICANTS

Bio-Aquatic Testing conducts reference toxicant testing monthly for organisms cultured in-house. For studies requiring purchased organisms, reference toxicant testing is performed simultaneously. Reference toxicant testing validates data and measures organism consistency. Only reagent grade chemicals are used of the following choices: sodium laurel sulfate (SLS), copper sulfate, copper chloride, potassium chloride, and sodium chloride. Organism responses are tracked with control charts for each reference toxicant/organism combination. The data are examined for sensitivity trends and to determine if results are within EPA described limits.

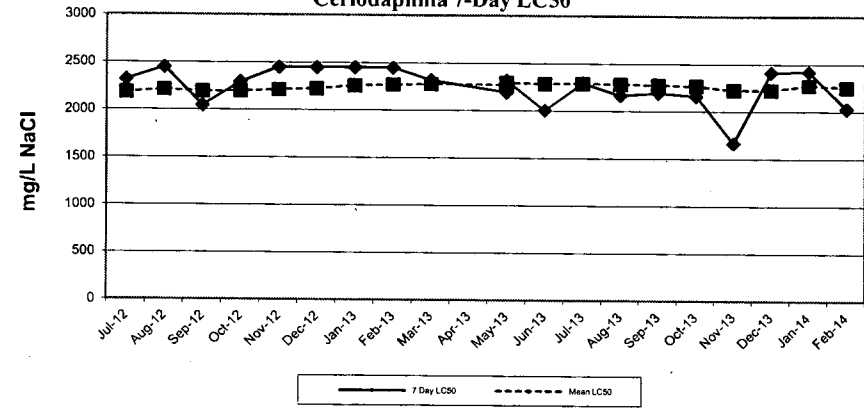
### CHRONIC REFERENCE TOXICANT TEST RESULTS

DILUTION WATER:	Standard Synthetic Freshwater
CHEMICAL:	Sodium Chloride
DURATION:	3-Brood Chronic
TEST NUMBER:	228
PROJECT NUMBER:	56888
START DATE:	2/27/2014
START TIME:	14:43
TOTAL NUMBER EXPOSED:	10 organisms per concentration
CONCENTRATIONS (mg/L):	CON 250 500 1000 2000 3000 4000
NUMBER DEAD PER CONCENTRATION:	0 0 0 2 1 10 10
TEST METHODS:	As listed in EPA-821-R-02-013
STATISTICAL METHODS:	SURVIVAL: Fisher's Exact Test  REPRODUCTION: ANOVA - Dunnett's
NOEC FOR SURVIVAL:	2000 mg/L
LOEC FOR SURVIVAL:	3000 mg/L
NOEC FOR REPRODUCTION:	500 mg/L
LOEC FOR REPRODUCTION:	1000 mg/L
PMSD:	18.6

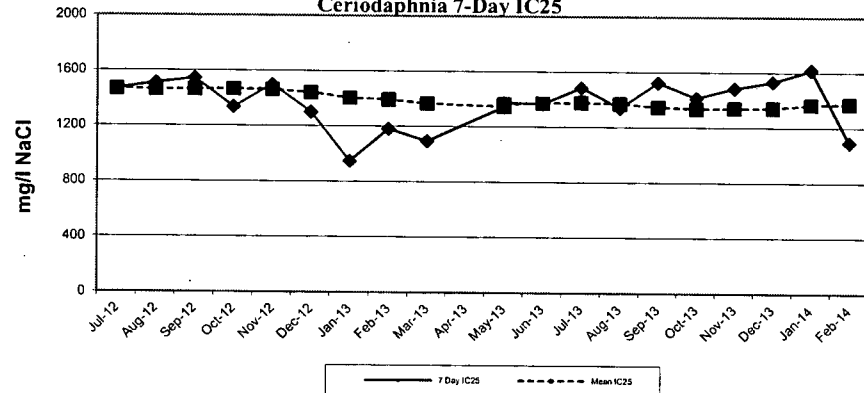
Ceriodaphnia Chronic Survival Control Chart



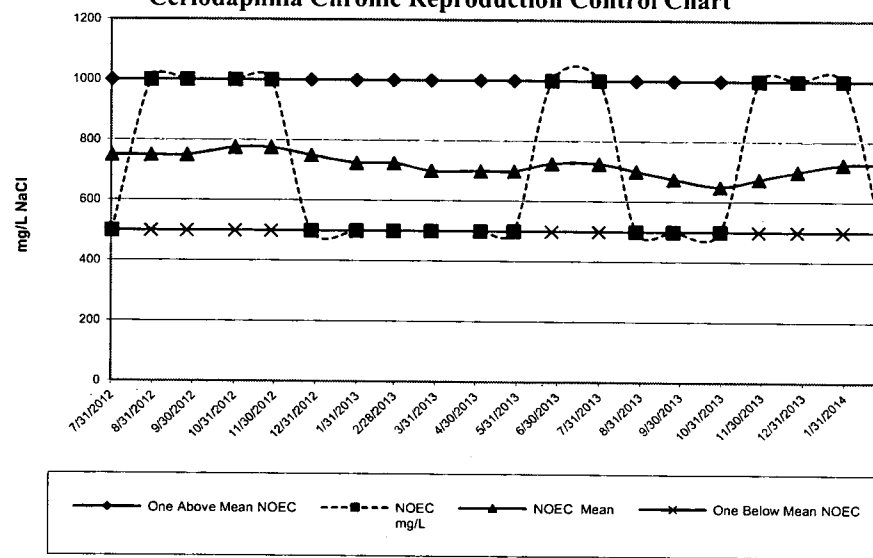
Ceriodaphnia 7-Day LC50



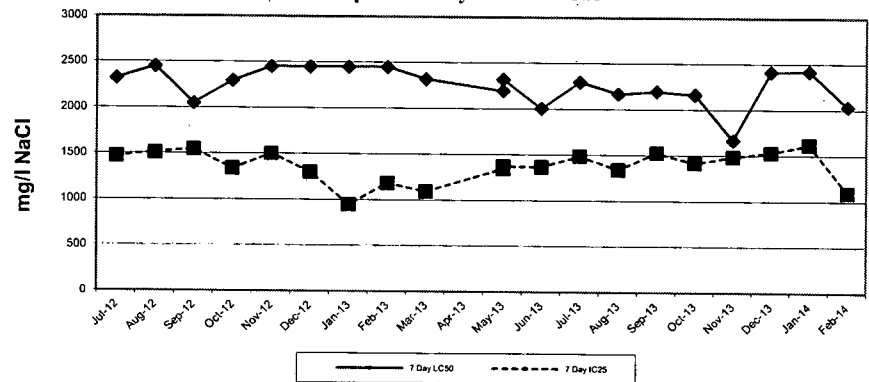
Ceriodaphnia 7-Day IC25



Ceriodaphnia Chronic Reproduction Control Chart



Ceriodaphnia 7-Day LC50 & IC25



## Appendix B

*Pimephales promelas*

### BIO-AQUATIC TESTING, INC.

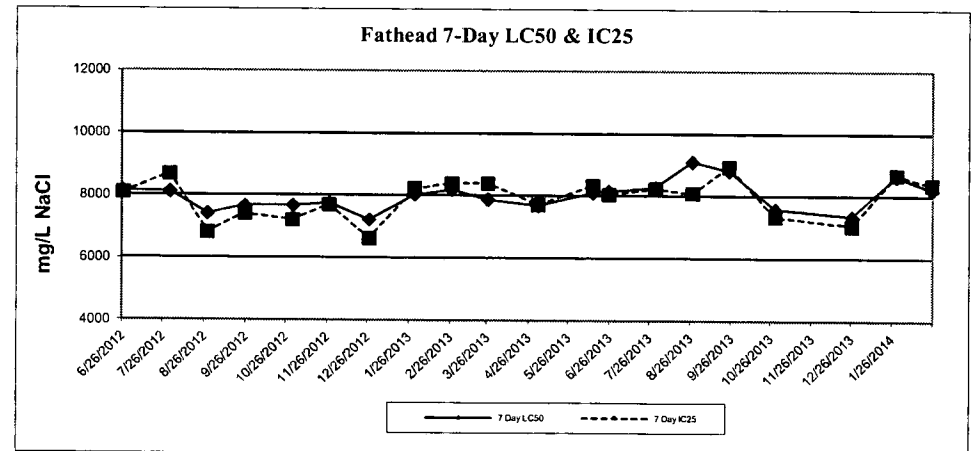
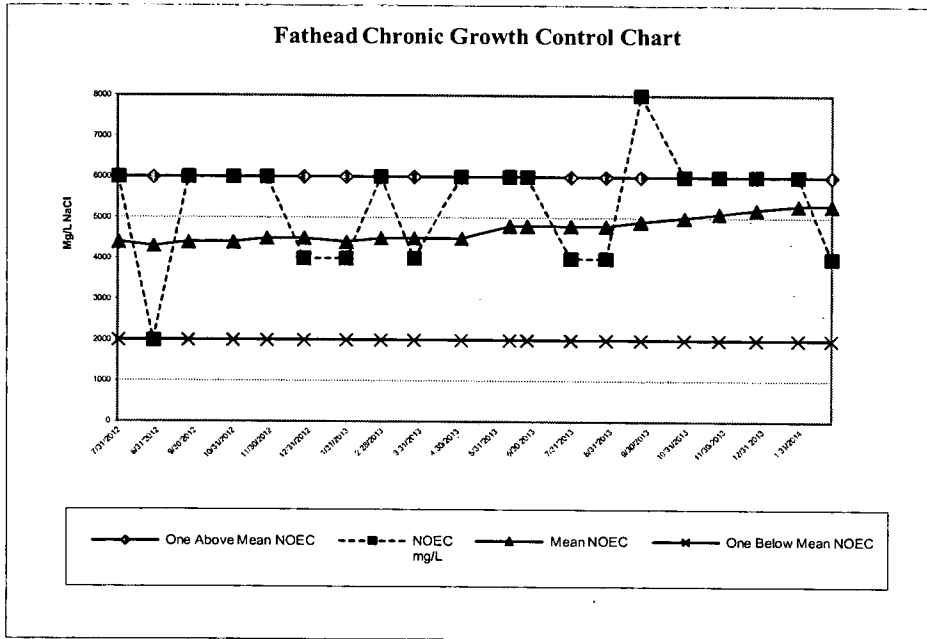
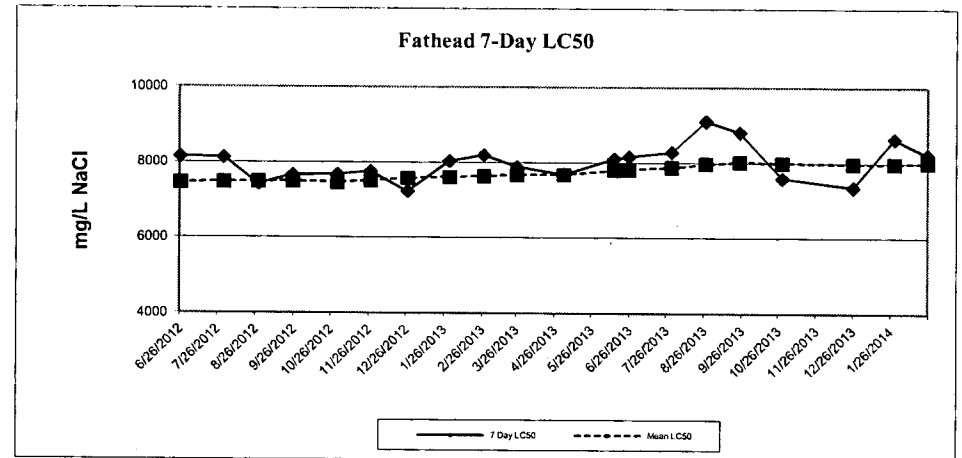
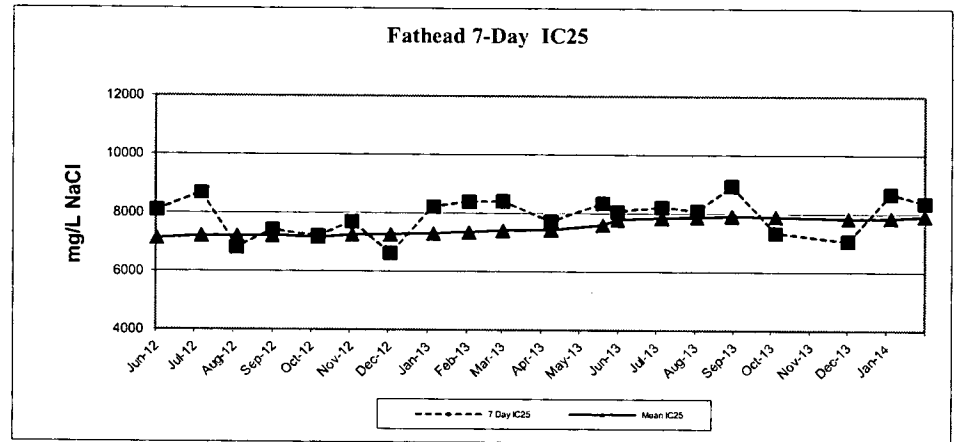
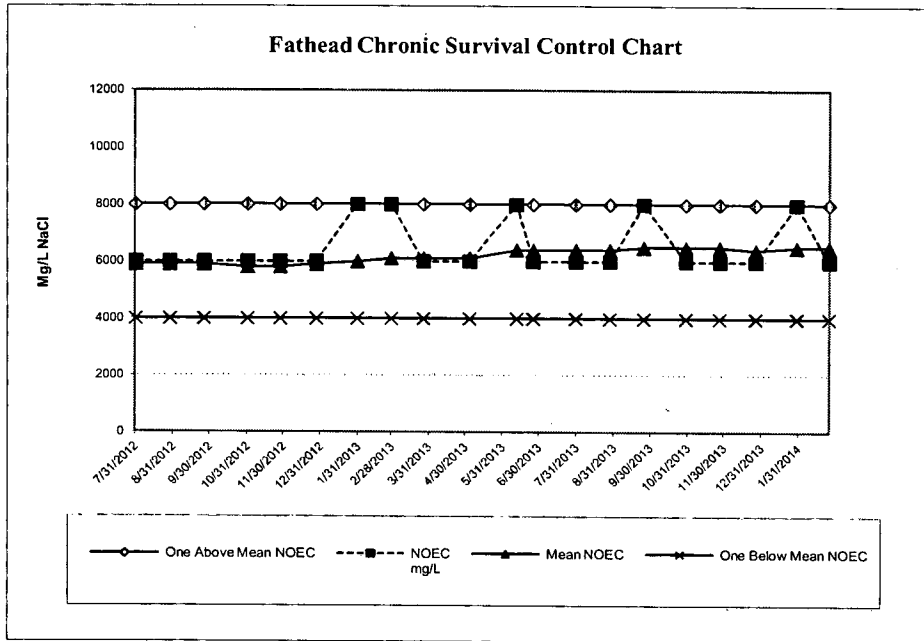
Carrollton, TX

#### REFERENCE TOXICANTS

Bio-Aquatic Testing conducts reference toxicant testing monthly for organisms cultured in-house. For studies requiring purchased organisms, reference toxicant testing is performed simultaneously. Reference toxicant testing validates data and measures organism consistency. Only reagent grade chemicals are used of the following choices: sodium laurel sulfate (SLS), copper sulfate, copper chloride, potassium chloride, and sodium chloride. Organism responses are tracked with control charts for each reference toxicant/organism combination. The data are examined for sensitivity trends and to determine if results are within EPA described limits.

#### CHRONIC REFERENCE TOXICANT TEST RESULTS

DILUTION WATER:	Standard Synthetic Freshwater
CHEMICAL:	Sodium Chloride
DURATION:	7 Days
TEST NUMBER:	268
PROJECT NUMBER:	56881
START DATE:	2/25/2014
START TIME:	16:10
TOTAL NUMBER EXPOSED:	40 organisms per concentration
CONCENTRATIONS (mg/L):	CON 2000 4000 6000 8000 10000 12000
NUMBER DEAD PER CONCENTRATION:	1 1 0 2 12 40 40
TEST METHODS:	As listed in EPA-821-R-02-013
STATISTICAL METHODS:	SURVIVAL: Steel's Many-One Rank Test GROWTH: ANOVA and Dunnett's Test
NOEC FOR SURVIVAL:	6000 mg/L
LOEC FOR SURVIVAL:	8000 mg/L
NOEC FOR GROWTH:	4000 mg/L
LOEC FOR GROWTH:	6000 mg/L
PMSD:	11.3



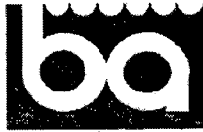
## APPENDIX C

### LITERATURE REFERENCES

- U.S.E.P.A., 2002. Short-Term Methods For Estimating The Chronic Toxicity Of Effluents And Receiving Water To Freshwater Organisms (Fifth Edition) U.S. Environmental Protection Agency, Office of Water, Washington D.C., EPA-821-R-02-012.
- U.S.E.P.A., 2002. Short-Term Methods For Estimating The Chronic Toxicity Of Effluents and Receiving Water To Marine And Estuarine Organisms (Third Edition) U.S. Environmental Protection Agency, Office of Water, Washington D.C., EPA-821-R-02-014.
- U.S.E.P.A., 2002. Short-Term Methods For Estimating The Chronic Toxicity Of Effluents And Receiving Water To Freshwater Organisms (Fourth Edition) U.S. Environmental Protection Agency, Office of Water, Washington D.C., EPA-821-R-02-013.
- U.S.E.P.A., 1991. Technical Support Document For Water Quality-Based Toxics Control, U.S. Environmental Protection Agency, EPA-505-2-90-001.
- Zarr, Jerrold, H., 1984. Biostatistical Analysis, (Second Edition). Prentice-Hall, Inc., Englewood Cliffs, N.J.

# CHAIN-OF-CUSTODY SHEETS

Appendix D



**BIO-AQUATIC TESTING, INC.**  
 2501 MAYES RD., STE. 100  
 CARROLLTON, TX 75006  
 PH: 972-242-7750 FAX: 972-242-7749

### CHAIN OF CUSTODY

Bio Only: No Sample Left  
 Lab Id: **56894**

Please Review & Complete Sections A, B, C, & D.

Sample No: **56894**

Check Sample No.: \_\_\_ First, \_\_\_ Second, or \_\_\_ Third.

P.O. No:

Client: Sorrells Research Associates Inc

Facility: Wynne, City of

Permit No: AR0021903

Outfall:

Client Contact: CECIL SORRELLS

Client Phone: (501) 562-8139

**B.** Use area below to make changes, if the Scheduled Test(s) in "A" are incorrect:

16936.0001 Freshwater Species					Saltwater Species	
C. dubia (water flea)	D. pulex (water flea)	D. magna (water flea)	P. promelas (minnow)	Selenastrum (green algae)	M. beryllina (minnow)	Mysidopsis (shrimp)
<input type="checkbox"/> Chronic	<input type="checkbox"/> Chronic	<input type="checkbox"/> Chronic	<input type="checkbox"/> Chronic	<input type="checkbox"/> 96 Hour	<input type="checkbox"/> Chronic	<input type="checkbox"/> Chronic
<input type="checkbox"/> 96 Hour	<input type="checkbox"/> 96 Hour	<input type="checkbox"/> 96 Hour	<input type="checkbox"/> 96 Hour	<input type="checkbox"/> 48 Hour	<input type="checkbox"/> 96 Hour	<input type="checkbox"/> 96 Hour
<input type="checkbox"/> 48 Hour	<input type="checkbox"/> 48 Hour	<input type="checkbox"/> 48 Hour	<input type="checkbox"/> 48 Hour	<input type="checkbox"/> 24 Hour	<input type="checkbox"/> 48 Hour	<input type="checkbox"/> 48 Hour
<input type="checkbox"/> 24 Hour	<input type="checkbox"/> 24 Hour	<input type="checkbox"/> 24 Hour	<input type="checkbox"/> 24 Hour		<input type="checkbox"/> 24 Hour	<input type="checkbox"/> 24 Hour

**A. REVIEW SCHEDULED TEST(S):**

Chronic	Ceriodaphnia dubia
Chronic	Pimephales promelas

To Ship the 1st Sample on: 3/10/2014

Concentration: 32 42 56 75 100

(For TX) Setup separate 24hr Acute Test?  No

Notes: 1st Quarter Chronic Cerio/Fathead  
 Must do 3 retests for any lethal failure (BG)

C. Sample ID or Location (Outfall No. or Name)	Sample Type: E = Effluent, RS = Rec. Stream, S = Sediment	Sample Date		Sample Time (military)		Grab or Composite	Sampled By: (Sign and Print Name)	Number Of Containers Shipped
		From	To	From	To			
1 001	E	3-9-14	3-10-14	0700	0700	C	Mohdi Haddidi	1
2								
3								

D. Relinquished By:	Date	Time	Received By:	Date	Time
<i>[Signature]</i>	3, 10, 14	1530	<i>[Signature]</i>	3-10-14	1530
			<i>[Signature]</i>	3-11-14	1155

<b>Bio-Aquatic Sample Login</b>	BAT sample personnel: <input type="radio"/> Yes <input checked="" type="radio"/> No	Date: <u>3-11-14</u>	Time: <u>1155</u>	By: <i>[Signature]</i>
	Check for Ammonia: <input type="radio"/> Yes <input checked="" type="radio"/> No	Temperature: <u>4.5</u> (C)	IR#: <u>002</u>	Int. Salinity: <u>        </u> ppt
	Dechlorinate Sample: <input type="radio"/> Yes <input checked="" type="radio"/> No	Chlorine: <u>0.1</u> mg/l	Ammonia: <u>0.25</u>	Other: <u>        </u>
	Dilution Water: <input type="radio"/> Receiving Stream <input checked="" type="radio"/> Synthetic Lab	pH: <u>7.1</u>	DO: <u>7.9</u> mg/l	Condition: <u>Good</u>

Temp @ Lab 7.9°C



**BIO-AQUATIC TESTING, INC.**  
 2601 MAYES RD., STE. 100  
 CARROLLTON, TX 75006  
 PH: 972-242-7750 FAX: 972-242-7749

**CHAIN OF CUSTODY**

No Only, No Sample Left

Lab Id : **56894**

Please Review & Complete Sections A, B, C, & D.

Sample No: **56894**

Check Sample No. : \_\_\_\_\_ First, \_\_\_\_\_ Second, or \_\_\_\_\_ Third.

P.O. No: \_\_\_\_\_

**Client:** Sorrells Research Associates Inc  
**Facility:** Wynne, City of  
**Permit No:** AR0021903  
**Outfall:**  
**Client Contact:** CECIL SORRELLS  
**Client Phone:** (501) 562-8139

**B.** Use area below to make changes, if the Scheduled Test(s) in "A" are incorrect:

Freshwater Species					Saltwater Species	
C. dubia (water flea)	D. pulex (water flea)	D. magna (water flea)	P. promelas (minnow)	Selenastrum (green algae)	M. beryllina (minnow)	Mysidopsis (shrimp)
<input type="checkbox"/> Chronic	<input type="checkbox"/> Chronic	<input type="checkbox"/> Chronic	<input type="checkbox"/> Chronic	<input type="checkbox"/> 96 Hour	<input type="checkbox"/> Chronic	<input type="checkbox"/> Chronic
<input type="checkbox"/> 96 Hour	<input type="checkbox"/> 96 Hour	<input type="checkbox"/> 96 Hour	<input type="checkbox"/> 96 Hour	<input type="checkbox"/> 48 Hour	<input type="checkbox"/> 96 Hour	<input type="checkbox"/> 96 Hour
<input type="checkbox"/> 48 Hour	<input type="checkbox"/> 48 Hour	<input type="checkbox"/> 48 Hour	<input type="checkbox"/> 48 Hour	<input type="checkbox"/> 24 Hour	<input type="checkbox"/> 48 Hour	<input type="checkbox"/> 48 Hour
<input type="checkbox"/> 24 Hour	<input type="checkbox"/> 24 Hour	<input type="checkbox"/> 24 Hour	<input type="checkbox"/> 24 Hour		<input type="checkbox"/> 24 Hour	<input type="checkbox"/> 24 Hour

**A. REVIEW SCHEDULED TEST(S):**

Chronic	Ceriodaphnia dubia
Chronic	Pimephales promelas

To Ship the 1st Sample on: 3/10/2014.

Concentration: 32 42 56 75 100

**Notes:** 1st Quarter Chronic Cerio/Fathead  
 Must do 3 retests for any lethal failure (BG)

(For TX.) Setup separate 24hr Acute Test?  No

Sample ID or Location: (Outfall No. or Name)	Sample Type: E = Effluent RS = Rec. Stream S = Sediment	Sample Date		Sample Time (military)		Grab or Composite	Sampled By: (Sign and Print Name)	Number of Containers Shipped
		From	To	From	To			
1 001	E	3-11-14	3-12-14			C		1
2								
3								

D.	Relinquished By:	Date	Time	Received By:	Date	Time
2						
3				<i>[Signature]</i>	3/13/14	0915

**Bio-Aquatic Sample Login**

BAT sample personnel:  Yes  No

Check for Ammonia:  Yes  No

Dechlorinate Sample:  Yes  No

Dilution Water:  Receiving Stream  Synthetic Lab

Date: 3/13 Time: 1222 By: *[Signature]*

Temperature: 36 (C) IR#: 002 Int. Salinity: ppt Adj. Salinity: ppt

Chlorine: 1.01 mg/l Ammonia: 0.28 Other: *[Signature]*

pH: 7.0 DO: 4.0 mg/l Condition: *[Signature]*

Temp at Lab 9.5





**BIO-AQUATIC TESTING, INC.**  
 2501 MAYES RD., STE. 100  
 CARROLLTON, TX 75006  
 PH: 972-242-7750 FAX: 972-242-7749

**CHAIN OF CUSTODY**

Bio Only, No Sample Lot.

Lab Id : **56894**

Please Review & Complete Sections A, B, C, & D.

Sample No: **56894**

16936-0003  
 Check Sample No. : \_\_\_\_\_ First, \_\_\_\_\_ Second, or Third.

P.O. No: \_\_\_\_\_

Client: Sorrells Research Associates Inc  
 Facility: Wynne, City of  
 Permit No: AR0021903  
 Outfall: \_\_\_\_\_  
 Client Contact: CECIL SORRELLS  
 Client Phone: (501) 562-8139

**B.** Use area below to make changes, if the Scheduled Test(s) in "A" are incorrect:

Freshwater Species					Saltwater Species	
C. dubia (water flea)	D. pulex (water flea)	D. magna (water flea)	P. promelas (minnow)	Selenastrum (green algae)	M. beryllina (minnow)	Mysidopsis (shrimp)
<input type="checkbox"/> Chronic	<input type="checkbox"/> Chronic	<input type="checkbox"/> Chronic	<input type="checkbox"/> Chronic	<input type="checkbox"/> 96 Hour	<input type="checkbox"/> Chronic	<input type="checkbox"/> Chronic
<input type="checkbox"/> 96 Hour	<input type="checkbox"/> 96 Hour	<input type="checkbox"/> 96 Hour	<input type="checkbox"/> 96 Hour	<input type="checkbox"/> 48 Hour	<input type="checkbox"/> 96 Hour	<input type="checkbox"/> 96 Hour
<input type="checkbox"/> 48 Hour	<input type="checkbox"/> 48 Hour	<input type="checkbox"/> 48 Hour	<input type="checkbox"/> 48 Hour	<input type="checkbox"/> 24 Hour	<input type="checkbox"/> 48 Hour	<input type="checkbox"/> 48 Hour
<input type="checkbox"/> 24 Hour	<input type="checkbox"/> 24 Hour	<input type="checkbox"/> 24 Hour	<input type="checkbox"/> 24 Hour		<input type="checkbox"/> 24 Hour	<input type="checkbox"/> 24 Hour

**A. REVIEW SCHEDULED TEST(S):**

Chronic	Ceriodaphnia dubia
Chronic	Pimephales promelas

To Ship the 1st Sample on: 3/10/2014

Concentration: 32 42 56 75 100

(For TX) Setup separate 24hr Acute Test?  Yes  No

Notes: 1st Quarter Chronic Cerio/Fathead  
 Must do 3 retests for any lethal failure (BC)

Sample ID or Location: (Outfall No. or Name)	Sample Type: E = Effluent RS = Rec. Stream S = Sediment	Sample Date		Sample Time (military)		Grab or Composite	Sampled By: (Sign and Print Name)	Number Of Containers Shipped
		From	To	From	To			
1 001	E	3-13-14	3-14-14	7:00	7:00		Mohdi Haddadi	1
2								
3								

Relinquished By:	Date	Time	Received By:	Date	Time
2			Favor Lewis	3-15-14	1530
3					

**Bio-Aquatic Sample Login**

BAT sample personnel:  Yes  No

Check for Ammonia:  Yes  No

Dechlorinate Sample:  Yes  No

Dilution Water:  Receiving Stream  Synthetic Lab

Date: 3-15-14 Time: 1530 By: *[Signature]*

Temperature: 3.5 (C) IR#: 002 Int. Salinity: \_\_\_\_\_ ppt Adj. Salinity: \_\_\_\_\_ ppt

Chlorine: 0.1 mg/l Ammonia: 0.25 Other: \_\_\_\_\_

pH: 6.9 DO: 9.9 mg/l Condition: Good

Temp 2 LAB 7.5

# REGULATORY AGENCY TABLES

Appendix E

Table 1 (Sheet 1 of 4 )  
BIOMONITORING REPORT

*Ceriodaphnia dubia* SURVIVAL AND REPRODUCTION TEST

Permittee: Sorrells Research Associates Inc - Wynne, City of  
 Permit No.: AR0021903  
 Outfall No.: \_\_\_\_\_

	Date/Time		Date/Time
Dates and times	FROM: <u>3/9/2014 @7:00</u>	TO: <u>3/10/2014@7:00</u>	
Composites were collected:	FROM: <u>3/11/2014 @07:00</u>	TO: <u>3/12/2014@07:00</u>	
	FROM: <u>3/13/2014 @7:00</u>	TO: <u>3/14/2014@7:00</u>	

Test Initiation: Time: 14:15 Date: 3/11/2014

Dilution Water Used:  Receiving Water  Synthetic Dilution Water

NUMBER OF YOUNG PRODUCED PER ADULT AT TEST TERMINATION

REPLICATE	EFFLUENT CONCENTRATION (%)					
	0%	32 %	42 %	56 %	75 %	100 %
A	30	33	31	31	28	31
B	33	34	25	36	28	26
C	30	18	18	20	16	24
D	34	26	12	16	16	27
E	29	24	34	34	27	26
F	29	32	32	27	24	32
G	E	28	30	31	28	28
H	30	28	32	24	32	22
I	28	30	34	33	24	25
J	33	26	D- 4	22	31	28
MEAN	30.6	27.9	27.5	27.4	25.4	26.9
CV % <sup>1</sup>	6.9	17.1	28.1	24.3	21.8	11.2
PMSD	Acceptable Range 47 or Less					21.5 %

<sup>1</sup> Coefficient of Variation = (standard deviation/mean) x 100) Calculations are based on young of the surviving females. Males are designated (M), and dead females are designated (D) along with the number of neonates released prior to death. (E) anomalous value, spilled cup, or technician error.

Table 1 (Sheet 2 of 4 )  
BIOMONITORING REPORT

*Ceriodaphnia dubia* SURVIVAL AND REPRODUCTION TEST

Permittee: Sorrells Research Associates Inc - Wynne, City of

Permit No.: AR0021903

Outfall No.: \_\_\_\_\_

PERCENT SURVIVAL

Time of Reading	EFFLUENT CONCENTRATION (%)					
	0%	32 %	42 %	56 %	75 %	100 %
24 HOURS	100.0	100.0	100.0	100.0	100.0	100.0
48 HOURS	100.0	100.0	100.0	100.0	100.0	100.0
7-DAY	100.0	100.0	90.0	100.0	100.0	100.0

1. DUNNETT'S PROCEDURE OR STEEL'S MANY-ONE RANK TEST OR WILCOXON RANK SUM TEST  
(with Bonferroni adjustment as appropriate for Sub-Lethality)

Is the mean number of young produced per adult significantly less ( $p=0.05$ ) than the number of young per adult in the control for the % effluent corresponding to significant non-lethal effects?

CRITICAL DILUTION ( 100 % ) : \_\_\_\_\_ YES \_\_\_\_\_ X \_\_\_\_\_ NO

If you report NO, enter a '0' on the DMR form for Parameter **TWP3B**, other wise enter a '1'. This parameter is also referred to as the 7-DAY *Ceriodaphnia* Sub-Lethal Pass/Fail.

2. FISHER'S EXACT TEST (as appropriate for Lethality)

Is the mean survival at test end significantly less ( $p=0.05$ ) than the control's survival for the % effluent corresponding to lethality?

CRITICAL DILUTION ( 100 % ) : \_\_\_\_\_ YES \_\_\_\_\_ X \_\_\_\_\_ NO

If you report NO, enter a '0' on the DMR form for Parameter **TLP3B**, other wise enter a '1'. This parameter is also referred to as the 7-DAY *Ceriodaphnia* Lethal Pass/Fail.

3. Enter the percent effluent corresponding to each NOEC/LOEC below:

a. NOEC Survival = 100 % Effluent (Parameter TOP3B)

b. LOEC Survival = Q\* % Effluent (Parameter TXP3B)

c. NOEC Reproduction = 100 % Effluent (Parameter TPP3B)

d. LOEC Reproduction = Q\* % Effluent (Parameter TYP3B)

Q\* refers to a value that is not calculable

Table 1 (Sheet 3 of 4 )  
BIOMONITORING REPORT

*Pimephales promelas* SURVIVAL AND GROWTH TEST

Permittee: Sorrells Research Associates Inc - Wynne, City of  
 Permit No.: AR0021903  
 Outfall No.: \_\_\_\_\_

	Date/Time		Date/Time
Dates and times	FROM: <u>3/9/2014 @ 7:00</u>	TO: <u>3/10/2014 @ 7:00</u>	
Composites were collected:	FROM: <u>3/11/2014 @ 07:00</u>	TO: <u>3/12/2014 @ 07:00</u>	
	FROM: <u>3/13/2014 @ 7:00</u>	TO: <u>3/14/2014 @ 7:00</u>	

Test Initiation: Time: 15:30 Date: 3/11/2014

Dilution Water Used:  Receiving Water  Synthetic Dilution Water

DATA TABLE FOR GROWTH OF *Pimephales promelas*

Effluent Concentration	Average Dry Weight in milligrams (mg) per replicate					Mean Dry Weight (mg)	CV % <sup>1</sup>
	A	B	C	D	E		
0%	0.497	0.537	0.531	0.536	0.509	0.522	3.43
32 %	0.548	0.604	0.575	0.672	0.589	0.598	7.73
42 %	0.621	0.502	0.572	0.549	0.651	0.579	10.16
56 %	0.644	0.613	0.628	0.503	0.560	0.590	9.80
75 %	0.671	0.700	0.659	0.593	0.638	0.652	6.16
100 %	0.657	0.668	0.692	0.642	0.672	0.666	2.83
PMSD	Acceptable Range 30 or Less					12.4 %	

<sup>1</sup> Coefficient of Variation = (standard deviation/mean) x 100)

?= cannot be calculated due to 100% mortality or lab exception

DATA TABLE FOR SURVIVAL OF *Pimephales promelas*

Effluent Concentration	Percent Survival per replicate					Average % Survival			CV % <sup>1</sup>
	A	B	C	D	E	24 Hours	48 Hours	7-Day	
0%	100	100	100	100	100	100	100	100	0.00
32 %	100	100	87.5	100	100	100	100	97.5	5.73
42 %	100	100	100	100	100	100	100	100	0.00
56 %	100	100	100	75	100	100	100	95	11.77
75 %	100	100	87.5	87.5	100	100	100	95	7.21
100 %	100	100	100	100	100	100	100	100	0.00

Table 1 (Sheet 4 of 4 )  
BIOMONITORING REPORT

*Pimephales promelas* SURVIVAL AND GROWTH TEST

Permittee: Sorrells Research Associates Inc - Wynne, City of  
Permit No.: AR0021903  
Outfall No.: \_\_\_\_\_

1. DUNNETT'S PROCEDURE OR STEEL'S MANY-ONE RANK TEST OR WILCOXON RANK SUM TEST (with Bonferroni adjustment as appropriate for Sub-Lethality)  
Is the mean dry weight at 7 days significantly less ( $p=0.05$ ) than the control's mean dry weight for the % effluent corresponding to significant non-lethal effects?

CRITICAL DILUTION ( 100 % ) : \_\_\_\_\_ YES \_\_\_\_\_ X \_\_\_\_\_ NO

If you report NO, enter a '0' on the DMR form for Parameter **TWP6C**, other wise enter a '1'. This parameter is also referred to as the 7-DAY *Pimephales* Sub-Lethal Pass/Fail.

2. DUNNETT'S PROCEDURE OR STEEL'S MANY-ONE RANK TEST OR WILCOXON RANK SUM TEST (as appropriate for Lethality) Is the survival at 7 days significantly less ( $p=0.05$ ) than the control's survival for % effluent corresponding to lethality?

CRITICAL DILUTION ( 100 % ) : \_\_\_\_\_ YES \_\_\_\_\_ X \_\_\_\_\_ NO

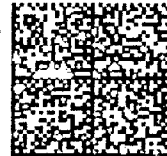
If you report NO, enter a '0' on the DMR form for Parameter **TLP6C**, other wise enter a '1'. This parameter is also referred to as the 7-DAY *Pimephales* Lethal Pass/Fail.

3. Enter the percent effluent corresponding to each NOEC/LOEC below:

			For DMR Form:
a.	NOEC Survival =	_____ 100 _____ % Effluent	(Parameter TOP6C)
b.	LOEC Survival =	_____ Q* _____ % Effluent	(Parameter TXP6C)
c.	NOEC Growth =	_____ 100 _____ % Effluent	(Parameter TPP6C)
d.	LOEC Growth =	_____ Q* _____ % Effluent	(Parameter TYP6C)

Q\* refers to a value that is not calculable

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←-----→  
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**Arkansas Department of Environmental Quality  
NPDES Enforcement Section  
5301 Northshore Dr.  
North Little Rock, Arkansas 72118-5317**

