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: October 14, 2014
Date Received : September 8, 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 09/07-08/14 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 09/08/14 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: 17453.0001B TKR Reviewed By: K. E. Sorrells, M.S. [ ]

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QUALITY ASSURANCE

September 8, 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
Arkansas Analytical Inc.		/ /	0	/ /	0	0.00	0.0	0

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: 17453.0001B TKR

SORRELLS RESEARCH ASSOCIATES, INC.
8100 NATIONAL DRIVE, LITTLE ROCK, AR 72209
(501) 562-8139 (800) 331-8139
FAX # (501) 562-7025

CHAIN OF CUSTODY RECORD

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

FOR LAB/OFFICE USE ONLY
LAB # 17453-000 1B
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: WYNNE WATER UTILITIES

PROJECT NO:

SAMPLER(S) SIGNATURE/PRINT: Harrell Williams (HARRELL WILLIAMS)

SAMPLE NO.	SAMPLE COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP/GRAB	FIELD ANALYSIS PH	TEMP	FLOW	CL2	D.O. (W) D.O. (P)	CONTAINER TYPE PRESERVATIVE	ANALYSIS REQUIRED
	POST AERATION BASIN OUTFALL	9/7//14 7:00:00 AM	9/8/14 7:00 AM	COMP/24			0.759			6 - 1/2 GAL	BIO-MONITORING

	METHOD OF SHIPMENT (CIRCLE)	FIELD CALIBRATION RECORD				NOTES/COMMENTS/OBSERVATIONS
	FED-EX WALK-IN (SRA) UPS OTHER	PH 7				
		PH 4				Tampa Lab 8.3°
	TYPE OF SAMPLE(S): (CIRCLE)	PH 10				
	WATER SOIL (WW) SLUDGE OTHER	D. O.				
						FIELD ANALYSIS CONDUCTED BY: (SRA) CLIENT

RELINQUISHED BY: Harrell Williams DATE/TIME RECEIVED BY: DATE/TIME 9-8-14 1340

RELINQUISHED BY: DATE/TIME RECEIVED BY: DATE/TIME 9-8-14 1540

SORRELLS RESEARCH ASSOCIATES, INC.
8100 NATIONAL DRIVE, LITTLE ROCK, AR 72209
(501) 562-8139 (800) 331-8139
FAX # (501) 562-7025

CHAIN OF CUSTODY RECORD

PAGE ____ OF ____

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

FOR LAB/OFFICE USE ONLY
LAB # 17453-0002-B
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: WYNNE WATER UTILITIES

PROJECT NO:

SAMPLER(S) SIGNATURE/PRINT
Harrell Williams (HARRELL WILLIAMS)

SAMPLE NO.	SAMPLE COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP/GRAB	FIELD ANALYSIS PH	FIELD ANALYSIS TEMP	FLOW	CL2	D.O. (W) D.O. (P)	CONTAINER TYPE / PRESERVATIVE	ANALYSIS REQUIRED
	POST AERATION BASIN OUTFALL	9/9//14 7:00:00 AM	9/10/14 7:00 AM	COMP/24			0.710			6 - 1/2 GAL	BIO-MONITORING

METHOD OF SHIPMENT (CIRCLE): FED-EX WALK-IN (SRA) UPS OTHER

TYPE OF SAMPLE(S): (CIRCLE): WATER SOIL (W/W) SLUDGE OTHER

FIELD CALIBRATION RECORD
PH 7
PH 4
PH 10
D. O.

NOTES/COMMENTS/OBSERVATIONS
Temp Lab 6.5°

FIELD ANALYSIS CONDUCTED BY: (SRA) CLIENT

RELINQUISHED BY: Harrell Williams DATE/TIME ____ RECEIVED BY: ____ DATE/TIME 9-10-14 1400

RELINQUISHED BY: ____ DATE/TIME ____ RECEIVED BY: ____ DATE/TIME 9-10-14 1604

SORRELLS RESEARCH ASSOCIATES, INC.
8100 NATIONAL DRIVE, LITTLE ROCK, AR 72209
(501) 562-8139 (800) 331-8139
FAX # (501) 562-7025

CHAIN OF CUSTODY RECORD

PAGE ____ OF ____

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

FOR LAB/OFFICE USE ONLY
LAB # 17453-003B
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: WYNNE WATER UTILITIES

PROJECT NO:

SAMPLER(S) SIGNATURE/PRINT
Harrell Williams (HARRELL WILLIAMS)

SAMPLE NO.	SAMPLE COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP/GRAB	FIELD ANALYSIS PH	TEMP	FLOW	CL2	D.O. (W) D.O. (P)	CONTAINER TYPE PRESERVATIVE	ANALYSIS REQUIRED
	POST AERATION BASIN OUTFALL	9/11//14 7:00:00 AM	9/12/14 7:00 AM	COMP/24			0.785			6 - 1/2 GAL	BIO-MONITORING

METHOD OF SHIPMENT (CIRCLE)
FED-EX WALK-IN (SRA) UPS OTHER

TYPE OF SAMPLE(S): (CIRCLE)
WATER SOIL (W/W) SLUDGE OTHER

FIELD CALIBRATION RECORD
PH 7
PH 4
PH 10
D. O.

NOTES/COMMENTS/OBSERVATIONS
Temp Lab 17.9°

FIELD ANALYSIS CONDUCTED BY: (SRA) CLIENT

RELINQUISHED BY: Harrell Williams DATE/TIME RECEIVED BY: DATE/TIME 9-12-14 1350

RELINQUISHED BY: DATE/TIME RECEIVED BY: DATE/TIME 9-12-14 1550

Arkansas Analytical, Inc.

Toxicity Test Results

City of Wynne
NPDES PERMIT NUMBER: AR0021903
Third Quarter 2014

Fathead Minnow, *Pimephales promelas,* Larval Survival and Growth Test
Test 1000.0

Ceriodaphnia dubia, Survival and Reproduction Test
Test 1002.0

Prepared for: **Harrel Williams**
Wynne Water Utilities
121 East Merriman
Wynne, AR 72396

Prepared by: Arkansas Analytical, Inc
11701 I-30, Bldg 1 Suite 115
Little Rock, Arkansas 72209
Lab Number K409004

Wednesday, September 24, 2014

Introduction

This report contains test results for the toxicity testing of Wynne facility. The NPDES permit number is AR0021903. The plant located in Wynne, Arkansas,
is authorized to discharge treated municipal wastewater from the facility located as follows: approximately 1.5 miles West of Wynne on Hwy 284 to Bowden Road, thence south on Bowden Road approximately 0.25 mile in Cross County, Arkansas. The applicant's mailing address is: 121 East Merriman Avenue, Wynne, AR 72396.

Facility Coordinates: Latitude: 35° 13' 8.81"; Longitude: 90° 49' 41.25"

The permitted outfall is located at the following coordinates:

Outfall 001: Latitude: 35° 13' *OT';* Longitude: 90° 49' 52"

The permit requires chronic biomonitoring testing once per quarter for both *Ceriodaphnia dubia* and *Pimephales promelas.* The test results in this report represent the testing for the third quarter of 2014.

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:	9-7-14, 0700	9-8-14, 0700
Sample #2:	9-9-14, 0700	9-10-14, 0700
Sample #3:	9-11-14, 0700	9-12-14, 0700

Samples were composites collected at Outfall 001.

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:	9-8-14, 1640	10
Sample #2:	9-11-14, 1005	4 (on ice)
Sample #3:	9-12-14, 1630	8 (on ice)

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. However, due to its earlier characterization as toxic, synthetic water was substituted.

The dilution water used in the toxicity tests was synthetic moderately hard. It was prepared using Elga Maxima ultra pure water according to EPA specifications. Each batch 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 mls of test solution. The test temperature was 25 degrees Centigrade. Raw data and statistics are provided in Appendix D.

Test Organisms

The organisms used in Test 1000.0 were < 48 hour old Fathead Minnows, *Pimephales promelas*, which were purchased from Aquatox; a copy of the organism history is provided in Appendix E.

The organisms used in Test 1002.0 were < 24 hour old *Ceriodaphnia dubia* neonates, (all born within the same eight hours), obtained from an in-house culture. An organism history is provided in Appendix E.

Quality Assurance

Test Acceptability

TEST ACCEPTANCE CRITERIA for *Ceriodaphnia dubia*

Control Criteria	Results	Pass	Fail
Greater than or equal to 80% survival	100%	X	
Average of 15 or more young per surviving female	15.8	X	
At least 60% of surviving females should have produced 3 broods	90%	X	
The percent coefficient of variation between replicates must be 40% or less for the young of surviving females	21.9%	X	

TEST ACCEPTANCE CRITERIA for *Pimephales promelas*

Control Criteria	Results	Pass	Fail
Greater than or equal to 80% survival	100%	X	
The percent coefficient of variation between replicates must be 40% or less for survival	0.00%	X	
Minimum of 0.25 mg average dry weight of surviving controls	0.533	X	
The percent coefficient of variation between replicates must be 40% or less for growth	8.79%	X	

Reference Toxicant

The reference toxicant used was Potassium Chloride prepared in-house. The tests were performed using moderately hard water as dilution water. The results of the reference toxicant were:

REFERENCE TOXICANT

Ceriodaphnia dubia 8/5/14 – 8/12/14		*Pimephales promelas* 8/5/14 – 8/12/14	
NOEC Survival:	500 ppm KCl	NOEC Survival:	500 ppm KCl
LOEC Survival:	1000 ppm KCl	LOEC Survival:	1000 ppm KCl
NOEC Reproduction:	250 ppm KCl	NOEC Reproduction:	500 ppm KCl
LOEC Reproduction:	500 ppm KCl	LOEC Reproduction:	1000 ppm KCl

Quality Assurance charts are provided in Appendix F.

Summary of Results
City of Wynne

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)	17.0	%CV survival (critical dilution)	0%
%CV Reproduction (critical dilution)	14.7%	Mean dry weight (critical dilution)	0.587
PMSD Reproduction	24.1 %	%CV growth (critical dilution)	8.0%
		PMSD Growth	16.1 %

Conclusion

Chronic static renewal larval survival and growth test using fathead minnow, *Pimephales promelas*, (Method 1000.0)

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

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

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

Biomonitoring Analysts:

Ryan Hudgin / William Lindsey

Reviewed by:

Tracy Bounds (TB)

Tracy Bounds, lab manager

SUMMARY REPORTING FORMS FOR CHRONIC BIOMONITORING FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL *PIMEPHALES PROMELAS*

PERMITTEE: City of Wynne **NPDES #: AR0021903**

Sample Collection:	Date, Time Started	Date, Time Ended
Sample #1:	9-7-14, 0700	9-8-14, 0700
Sample #2:	9-9-14, 0700	9-10-14, 0700
Sample #3:	9-11-14, 0700	9-12-14, 0700

Test initiated (date, time): 9-9-14, 1420 Test terminated (date, time): 9-16-14, 1200

Dilution water used: Moderately Hard 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	100	100	100	100		100	100	100	0.00
32%	90	90	100	100	100		100	100	96	
42%	100	100	100	100	100		100	100	100	
56%	100	100	100	100	100		100	100	100	
75%	100	100	100	90	100		100	100	98	
100%	100	100	100	100	100		100	100	100	0.00

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%	0.550	0.575	0.555	0.454	0.531		0.533	8.79
32%	0.480	0.575	0.562	0.699	0.670		0.597	
42%	0.668	0.529	0.529	0.577	0.670		0.595	
56%	0.516	0.485	0.536	0.508	0.513		0.512	
75%	0.621	0.603	0.631	0.651	0.551		0.611	
100%	0.531	0.620	0.606	0.543	0.636		0.587	8.0

Coefficient of Variation = standard deviation / mean * 100

SUMMARY REPORTING 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) and 2.a) enter [0] otherwise enter [1]:_____**0**_____

4. Enter the response to item 3 on DMR Form, parameter # TEP6C.

5. Enter percent effluent corresponding to each NOEC below and circle the lowest number:

   a) NOEC survival = _____**100**_____% effluent

   b) NOEC growth = _____**100**____% effluent

   c) Coefficient of variation (parameter TQP6C)= _____**8.79**_____%

6. Enter Whole Effluent Toxicity: _____**100**____%

SUMMARY REPORTING FORMS FOR CHRONIC BIOMONITORING
Ceriodaphnia dubia SURVIVAL AND REPRODUCTION

Permittee: City of Wynne **NPDES #:AR0021903**

Sample Collection:	Date, Time Started	Date, Time Ended
Sample #1:	9-7-14, 0700	9-8-14, 0700
Sample #2:	9-9-14, 0700	9-10-14, 0700
Sample #3:	9-11-14, 0700	9-12-14, 0700

Test initiated (date, time): 9-9-14, 1500 Test terminated (date, time): 9-16-14, 1400

Dilution water used: Moderately Hard Synthetic

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

	PERCENT EFFLUENT					
Replicate	0%	32%	42%	56%	75%	100%
A	19	16	17	13	14	12
B	13	18	6	10	18	15
C	12	7	20	20	18	21
D	13	12	15	15	14	19
E	16	15	16	21	19	17
F	22	16	10	12	12	19
G	14	11	19	21	18	18
H	20	21	10	9	14	16
I	16	15	18	12	16	16
J	13	15	11	18	15	17
Mean	15.8	14.6	14.2	15.1	15.8	17.0
Mean/surviving female	15.8	14.6	14.2	15.1	15.8	17.0
CV%*	21.9					14.7

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: City of Wynne **NPDES #: AR0021903**

PERCENT SURVIVAL

PERCENT EFFLUENT	0%	32%	42%	56%	75%	100%
Time of Reading: 24 HOURS	100	100	100	100	100	100
48 HOURS	100	100	100	100	100	100
Test termination	100	100	100	100	100	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 control's number of young per female for:

   a) LOW FLOW OR CRITICAL DILUTION, (100%): YES_____ NO____**X**____

3. If NO was answered to 1.a) and 2.a) enter [0] otherwise enter [1]:_____**0**_____

4. Enter response to item 3 on DMR Form, parameter # TEP3B.

5. Enter percent effluent corresponding to each NOEC below and circle the lowest number:

   a) NOEC survival = _____**100**_____ % effluent

   b) NOEC reproduction = _____**100**_____% effluent

   c) Coefficient of variation (parameter TQP6C)= _____**21.9**_____%

6. Enter Whole Effluent Toxicity: _____**100**____%

APPENDIX A

Chain of Custody Forms

SORRELLS RESEARCH ASSOCIATES, INC.
8100 NATIONAL DRIVE, LITTLE ROCK, AR 72209
(501) 562-8139 (800) 331-8139
FAX # (501) 562-7025

CHAIN OF CUSTODY RECORD

PAGE ____ OF ____

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

FOR LAB/OFFICE USE ONLY
LAB # 17453-0001
CLIENT # ____
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: WYNNE WATER UTILITIES

PROJECT NO:

SAMPLER(S) SIGNATURE/PRINT: Harrell Williams (HARRELL WILLIAMS)

SAMPLE NO.	SAMPLE COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP/GRAB	FIELD ANALYSIS PH	TEMP	FLOW	CL2	D.O. (W) D.O. (P)	CONTAINER TYPE / PRESERVATIVE	ANALYSIS REQUIRED
	POST AERATION BASIN OUTFALL	9/7//14 7:00:00 AM	9/8/14 7:00 AM	COMP/24			0.759			6 - 1/2 GAL	BIO-MONITORING
											K14D9004-A

	Yes	No
Custody Seals:	✓	
Containers Correct:	1	
COC/Labels Agree:		
~~Preservation Confirmed:~~		e Ad
Received on Ice:		✓
Temperature on Receipt:	10 °C	HHT#2

Samples Received at Arkansas Analytical
Relinquished By: Ceal Sorrells
Date/Time: 9/8/14 @ 1640
Received By: Amanda Forbush

METHOD OF SHIPMENT (CIRCLE)	FIELD CALIBRATION RECORD				NOTES/COMMENTS/OBSERVATIONS
FED-EX WALK-IN (SRA) UPS OTHER	PH 7				
	PH 4				Temp lab 8.3 °
TYPE OF SAMPLE(S): (CIRCLE)	PH 10				
WATER SOIL (W/W) SLUDGE OTHER	D. O.				
					FIELD ANALYSIS CONDUCTED BY: (SRA) CLIENT

RELINQUISHED BY: Harrell Williams DATE/TIME ____ RECEIVED BY: ____ DATE/TIME 9-8-14 1340

RELINQUISHED BY: ____ DATE/TIME ____ RECEIVED BY: ____ DATE/TIME 9-8-14 1540

SORRELLS RESEARCH ASSOCIATES, INC.
8100 NATIONAL DRIVE, LITTLE ROCK, AR 72209
(501) 562-8139 (800) 331-8139
FAX # (501) 562-7025

CHAIN OF CUSTODY RECORD

PAGE ____ OF ____

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

FOR LAB/OFFICE USE ONLY
LAB # 17453-0002
CLIENT # ____
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: WYNNE WATER UTILITIES

PROJECT NO:

SAMPLER(S) SIGNATURE/PRINT: Harrell Williams (HARRELL WILLIAMS)

SAMPLE NO.	SAMPLE COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP/GRAB	FIELD ANALYSIS PH	TEMP	FLOW	CL2	D.O. (W) D.O. (P)	CONTAINER TYPE / PRESERVATIVE	ANALYSIS REQUIRED K1409-004-
	POST AERATION BASIN OUTFALL	9/9//14 7:00:00 AM	9/10/14 7:00 AM	COMP/24			0.710			6 - 1/2 GAL	BIO-MONITORING B

Samples Received at Arkansas Analytical
Relinquished By: Allen Baker
Date/Time: 9-11-14, 1005
Received By: Sydney Jarvis

	Yes	No
Custody Seals:	X	
Containers Correct:	X	
COC/Labels Agree:	X	
Received on Ice:	X	
Temperature on Receipt:	4°C	
Temperature Gun ID:	HHT # 2	

METHOD OF SHIPMENT (CIRCLE)
FED-EX WALK-IN (SRA) UPS OTHER

TYPE OF SAMPLE(S): (CIRCLE)
WATER SOIL (W/W) SLUDGE OTHER

FIELD CALIBRATION RECORD
PH 7
PH 4
PH 10
D. O.

NOTES/COMMENTS/OBSERVATIONS
Temp @ Lab 6.5°

FIELD ANALYSIS CONDUCTED BY: (SRA) CLIENT

RELINQUISHED BY: Harrell Williams	DATE/TIME	RECEIVED BY:	DATE/TIME 9-10-14 1400
RELINQUISHED BY:	DATE/TIME	RECEIVED BY:	DATE/TIME 9-10-14 1600

SORRELLS RESEARCH ASSOCIATES, INC.
8100 NATIONAL DRIVE, LITTLE ROCK, AR 72209
(501) 562-8139 (800) 331-8139
FAX # (501) 562-7025

CHAIN OF CUSTODY RECORD

PAGE ____ OF ____

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

FOR LAB/OFFICE USE ONLY
LAB # 17453-003B
CLIENT # ____
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: WYNNE WATER UTILITIES

PROJECT NO:

SAMPLER(S) SIGNATURE/PRINT
Harrell Williams (HARRELL WILLIAMS)

SAMPLE NO.	SAMPLE COLLECTION LOCATION	START DATE/TIME	END DATE/TIME	COMP/GRAB	FIELD ANALYSIS PH	TEMP	FLOW	CL2	D.O. (W) D.O. (P)	CONTAINER TYPE PRESERVATIVE	ANALYSIS REQUIRED
	POST AERATION BASIN OUTFALL	9/11//14 7:00:00 AM	9/12/14 7:00 AM	COMP/24			0.785			6 - 1/2 GAL	BIO-MONITORING
											K14090004 C

Custody Seals: Yes ✓ No
Containers Correct: ✓
COC/Labels Agree: ✓
~~Preservation Confirmed:~~ eff
Received on Ice: ✓
Temperature on Receipt: 8° C. HACH2

Samples Received at Arkansas Analytical
Relinquished By: C. Sorrells
Date/Time: 9-12-14 1630
Received By: Amanda Fobush

Tested Lab 17.9°

METHOD OF SHIPMENT (CIRCLE)
FED-EX WALK-IN (SRA) UPS OTHER

TYPE OF SAMPLE(S): (CIRCLE)
WATER SOIL (W/W) SLUDGE OTHER

FIELD CALIBRATION RECORD
PH 7
PH 4
PH 10
D. O.

FIELD ANALYSIS CONDUCTED BY: (SRA) CLIENT

RELINQUISHED BY: Harrell Williams DATE/TIME
RECEIVED BY: DATE/TIME 9-12-14 1350

RELINQUISHED BY: DATE/TIME
RECEIVED BY: DATE/TIME 9-12-14 1550

APPENDIX B

Effluent and Dilution Water Data

CHEMICAL DATA SHEET FOR CHRONIC TOXICITY TESTING									Fathead Minnow
Lab # / Sample ID		K1409004				Test Start (Date/Time)		9-9-14	1500 ITF 1420
Client:		Wynne				Test End (Date/Time)		9-16-14	1200
		Day of Test							
		1	2	3	4	5	6	7	notes
Control	MHS	9-9	9-10	9-11	9-12	9-13	9-14	9-15	
D.O. (mg/L)	INITIAL	8.8	8.5	8.5	~~8.7~~ 8.0	8.7	8.7	8.9	
	FINAL	8.1	8.5	8.2	7.9	7.8	8.2	8.2	
pH (s.u.)	INITIAL	7.2	8.0	7.6	7.6	8.1	8.0	7.8	
	FINAL	7.1	7.4	7.8	7.7	7.8	7.8	7.8	
temp (C)	INITIAL	22	21	20	21	21	21	21	
	FINAL	25	25	25	25	25	25	25	
ALKALINITY (mg/L)		62	—	64	—	—	—	—	
HARDNESS (mg/L)		94	—	82	—	—	—	—	
CONDUCTIVITY (umhc		911	—	375	—	—	—	—	
CHLORINE (mg/L)		<0.05	—	—	—	—	—	—	
CONC:	32								
D.O. (mg/L)	INITIAL	8.5	8.9	8.9	8.7	8.5	8.4	9.0	
	FINAL	8.2	~~7.8~~ HF 8.1	8.5	8.6	8.3	7.7	7.5	
pH (s.u)	INITIAL	7.9	7.8	7.7	7.9	7.7	7.8	7.9	
	FINAL	7.7	~~8.0~~ HF 8.3	7.7	7.8	8.0	7.7	7.6	
temp (C)	INITIAL	22	21	22	22	22	21	21	
	FINAL	25	25	25	25	25	25	25	
CONC:	42								
D.O. (mg/L)	INITIAL	8.5	8.9	8.9	8.7	8.7	8.6	9.1	
	FINAL	8.1	8.0	8.3	8.6	8.3	~~7.8~~	~~7.3~~	
pH (mg/L)	INITIAL	7.8	7.7	~~7.7~~	~~7.8~~	7.8	7.7	7.9	
	FINAL	7.8	8.0	7.7	~~7.8~~	7.9	~~7.7~~	7.6	
temp (C)	INITIAL	21	20	22	23	22	21	21	
	FINAL	25	25	25	25	25	25	25	
CONC:	56								
D.O. (mg/L)	INITIAL	8.4	9.0	8.9	8.8	8.8	8.6	9.1	
	FINAL	8.0	8.0	8.3	8.6	8.3	~~7.8~~	~~7.3~~	
pH (s.u.)	INITIAL	7.7	7.7	7.6	7.7	7.8	7.9	~~7.8~~	
	FINAL	7.8	8.2	7.7	~~7.8~~	7.9	~~7.7~~	7.6	
temp (C)	INITIAL	22	20	22	23	22	22	21	
	FINAL	25	25	25	25	25	25	25	
CONC:	75								
D.O. (mg/L)	INITIAL	8.3	9.2	9.0	8.7	8.7	8.8	9.2	
	FINAL	8.0	7.9	8.3	8.5	8.3	~~7.8~~	~~7.3~~	
pH (s.u.)	INITIAL	7.6	7.5	7.5	7.6	7.7	7.8	7.7	
	FINAL	7.8	8.3	7.6	7.7	7.8	7.7	7.6	
temp (C)	INITIAL	22	19	23	24	23	22	21	
	FINAL	25	25	25	25	25	25	25	
CONC:	100								
D.O. (mg/L)	INITIAL	8.3	9.1	9.2	8.9	8.9	8.8	9.3	
	FINAL	8.0	7.9	8.6	8.5	8.2	8.0	7.4	
pH (s.u.)	INITIAL	7.6	7.3	7.3	7.5	7.6	7.8	7.7	
	FINAL	7.7	~~8.5~~ HF 7.8	7.6	7.0	7.3	7.7	7.6	
temp (C)	INITIAL	22	20	23	24	23	22	20	
	FINAL	25	25	25	25	25	25	25	
CONC:	100 %	A	A	A	B	B	C	C	
ALKALINITY (mg/L)		34	—	—	26	—	36	—	
HARDNESS (mg/L)		148	—	—	170	—	148	—	
CONDUCTIVITY (umhc		682	—	—	683	—	688	—	
CHLORINE (mg/L)		<0.05	—	—	<0.05	—	0.06	—	

CHEMICAL DATA SHEET FOR CHRONIC TOXICITY TESTING									Ceriodaphnia Dubia
Lab # / Sample ID		K1409004				Test Start (Date/Time)		9-9-14	1500
Client:		Wynne				Test End (Date/Time)		9-16-14	1400
		Day of Test							
		1	2	3	4	5	6	7	notes
Control	MHS	9-9	9-10	9-11	9-12	9-13	9-14	9-15	
D.O. (mg/L)	INITIAL	8.8	8.5	8.5	8.7	8.7	8.7	8.9	
	FINAL	8.2	8.6	7.9	8.2	9.0	8.5	7.9	
pH (s.u.)	INITIAL	7.2	8.0	7.8	7.8	8.1	8.0	7.6	
	FINAL	7.4	2HHF 7.9	8.1	8.0	7.3	8.2	8.1	
temp (C)	INITIAL	22	2HHF 1	20	21	21	21	21	
	FINAL	25	25	25	25	25	25	25	
ALKALINITY (mg/L)		62	—	64	—	—	—	—	
HARDNESS (mg/L)		94	—	82	—	—	—	—	
CONDUCTIVITY (umhc		411	—	375	—	—	—	—	
CHLORINE (mg/L)		<0.05	—	—	—	—	—	—	
CONC:	32								
D.O. (mg/L)	INITIAL	8.5	8.8	8.9	8.7	8.5	8.4	9.0	
	FINAL	8.2	8.3	8.1	8.2	9.0	8.0	7.8	
pH (s.u)	INITIAL	7.9	7.8	7.7	7.9	7.7	7.8	7.9	
	FINAL	7.6	7.9	8.0	8.0	7.8	8.1	8.0	
temp (C)	INITIAL	22	21	22	22	22	21	21	
	FINAL	25	25	25	25	25	25	25	
CONC:	42								
D.O. (mg/L)	INITIAL	8.5	8.9	8.9	8.7	8.7	8.6	9.1	
	FINAL	8.2	8.3	8.2	8.1	9.0	8.0	7.8	
pH (mg/L)	INITIAL	7.8	7.7	7.7	7.8	7.8	7.7	7.9	
	FINAL	7.8	7.9	8.0	8.0	8.0	8.1	8.0	
temp (C)	INITIAL	21	20	22	23	22	21	21	
	FINAL	25	25	25	25	25	25	25	
CONC:	56								
D.O. (mg/L)	INITIAL	8.4	9.0	8.9	8.8	8.8	8.6	9.1	
	FINAL	8.2	8.3	8.2	8.1	9.0	8.0	7.8	
pH (s.u.)	INITIAL	7.7	7.7	7.6	7.7	7.8	7.9	7.8	
	FINAL	7.8	7.9	7.9	8.0	8.0	8.1	8.0	
temp (C)	INITIAL	22	20	22	23	22	22	21	
	FINAL	25	25	25	25	25	25	25	
CONC:	75								
D.O. (mg/L)	INITIAL	8.3	9.2	9.0	8.7	8.7	8.8	9.2	
	FINAL	8.3	8.3	8.2	8.2	9.0	8.1	7.9	
pH (s.u.)	INITIAL	7.6	7.5	7.5	7.6	7.7	7.8	7.7	
	FINAL	7.8	7.9	7.8	8.1	8.0	8.1	7.9	
temp (C)	INITIAL	22	19	23	24	23	22	21	
	FINAL	22HHF5	25	25	25	25	25	25	
CONC:	00								
D.O. (mg/L)	INITIAL	8.3	9.1	9.2	8.9	8.9	8.8	9.3	
	FINAL	8.2	8.3	8.2	8.2	9.0	8.2	8.2	
pH (s.u.)	INITIAL	7.6	7.3	7.3	7.5	7.6	7.8	7.7	
	FINAL	7.8	7.8	7.9	8.1	8.0	8.1	8.0	
temp (C)	INITIAL	22	20	23	24	23	22	20	
	FINAL	25	25	25	25	25	25	25	
CONC:	100 %	A	A	A	B	B	C	C	
ALKALINITY (mg/L)		34	—	—	28	—	36	—	
HARDNESS (mg/L)		148	—	—	170	—	148	—	
CONDUCTIVITY (umhc		682	—	—	683	—	688	—	
CHLORINE (mg/L)		<0.05	—	—	<0.05	—	0.06	—	

APPENDIX C

Fathead minnow raw data and statistics

Pimephales promelas **FATHEAD MINNOW**

SURVIVAL DATA FOR LARVAL SURVIVAL AND GROWTH TEST (CHRONIC)

LAB #: K1409004	TEST START	DATE 9-Sep-14	TIME 1420
CLIENT: Wynne	TEST END	DATE 16-Sep-14	TIME 1200
ANALYST: RH/HF/WL	AGE AND SOURCE OF MINNOWS		

			DAY(NUMBER SURVIVING)							SURVIVAL		
	REP #	START	1	2	3	4	5	6	7	%	MEAN %	CV
CONTROL	A	10	10	10	10	10	10	10	10	100%		
	B	10	10	10	10	10	10	10	10	100%		
	C	10	10	10	10	10	10	10	10	100%	*100.0%*	*0.00*
MHS	D	10	10	10	10	10	10	10	10	100%		
	E	10	10	10	10	10	10	10	10	100%		
	REP #	START	1	2	3	4	5	6	7	%	MEAN %	CV
CONC:	A	10	10	10	10	10	10	10	9	90%		
	B	10	10	10	10	10	10	10	9	90%		
	C	10	10	10	10	10	10	10	10	100%	*96.0%*	
32%	D	10	10	10	10	10	10	10	10	100%		
	E	10	10	10	10	10	10	10	10	100%		
	REP #	START	1	2	3	4	5	6	7	%	MEAN %	CV
CONC:	A	10	10	10	10	10	10	10	10	100%		
	B	10	10	10	10	10	10	10	10	100%		
	C	10	10	10	10	10	10	10	10	100%	*100.0%*	
42%	D	10	10	10	10	10	10	10	10	100%		
	E	10	10	10	10	10	10	10	10	100%		
	REP #	START	1	2	3	4	5	6	7	%	MEAN %	CV
CONC:	A	10	10	10	10	10	10	10	10	100%		
	B	10	10	10	10	10	10	10	10	100%		
	C	10	10	10	10	10	10	10	10	100%	*100.0%*	
56%	D	10	10	10	10	10	10	10	10	100%		
	E	10	10	10	10	10	10	10	10	100%		
	REP #	START	1	2	3	4	5	6	7	%	MEAN %	CV
CONC:	A	10	10	10	10	10	10	10	10	100%		
	B	10	10	10	10	10	10	10	10	100%		
	C	10	10	10	10	10	10	10	10	100%	*98.0%*	
75%	D	10	10	10	10	10	10	9	9	90%		
	E	10	10	10	10	10	10	10	10	100%		
	REP #	START	1	2	3	4	5	6	7	%	MEAN %	CV
CONC:	A	10	10	10	10	10	10	10	10	100%		
	B	10	10	10	10	10	10	10	10	100%		
	C	10	10	10	10	10	10	10	10	100%	*100.0%*	*0.00*
100%	D	10	10	10	10	10	10	10	10	100%		
	E	10	10	10	10	10	10	10	10	100%		
ANALYST:		RH	RH	RH	RH	HF	WL	HF	RH			
DATE:		9/9/14	9/10/14	9/11/14	9/12/14	9/13/14	9/14/14	9/15/14	9/16/14			
TIME:		1420	1000	1030	1100	1020	1500	1000	1200			

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

REMARKS:

AA# K1409004,FATHEAD MINNOW SURVIVAL,CHRONIC,9-9-14
File: C:\COPYTO~1\TOXSTAT\FHSURV~1. Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.053

W = 0.714

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

Data FAIL normality test. Try another transformation.

Warning - The first three homogeneity tests are sensitive to non-normal data and should not be performed.

AA# K1409004,FATHEAD MINNOW SURVIVAL,CHRONIC,9-9-14
File: C:\COPYTO~1\TOXSTAT\FHSURV~1. Transform: ARC SINE(SQUARE ROOT(Y))

Hartley's test for homogeneity of variance
Bartlett's test for homogeneity of variance

These two tests can not be performed because at least one group has zero variance.

Data FAIL to meet homogeneity of variance assumption.
Additional transformations are useless.

TITLE: AA# K1409004,FATHEAD MINNOW SURVIVAL,CHRONIC,9-9-14
FILE: C:\COPYTO~1\TOXSTAT\FHSURV~1.
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	1.0000	1.4120
1	CONTROL	2	1.0000	1.4120
1	CONTROL	3	1.0000	1.4120
1	CONTROL	4	1.0000	1.4120
1	CONTROL	5	1.0000	1.4120
2	32 % EFFLUENT	1	0.9000	1.2490
2	32 % EFFLUENT	2	0.9000	1.2490
2	32 % EFFLUENT	3	1.0000	1.4120
2	32 % EFFLUENT	4	1.0000	1.4120
2	32 % EFFLUENT	5	1.0000	1.4120

3	42	%	EFFLUENT	1	1.0000 1.4120
3	42	%	EFFLUENT	2	1.0000 1.4120
3	42	%	EFFLUENT	3	1.0000 1.4120
3	42	%	EFFLUENT	4	1.0000 1.4120
3	42	%	EFFLUENT	5	1.0000 1.4120
4	56	%	EFFLUENT	1	1.0000 1.4120
4	56	%	EFFLUENT	2	1.0000 1.4120
4	56	%	EFFLUENT	3	1.0000 1.4120
4	56	%	EFFLUENT	4	1.0000 1.4120
4	56	%	EFFLUENT	5	1.0000 1.4120
5	75	%	EFFLUENT	1	1.0000 1.4120
5	75	%	EFFLUENT	2	1.0000 1.4120
5	75	%	EFFLUENT	3	1.0000 1.4120
5	75	%	EFFLUENT	4	0.9000 1.2490
5	75	%	EFFLUENT	5	1.0000 1.4120
6	100	%	EFFLUENT	1	1.0000 1.4120
6	100	%	EFFLUENT	2	1.0000 1.4120
6	100	%	EFFLUENT	3	1.0000 1.4120
6	100	%	EFFLUENT	4	1.0000 1.4120
6	100	%	EFFLUENT	5	1.0000 1.4120

AA# K1409004,FATHEAD MINNOW SURVIVAL,CHRONIC,9-9-14
File: C:\COPYTO~1\TOXSTAT\FHSURV~1. Transform: ARC SINE(SQUARE ROOT(Y))

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	1.412				
2	32 % EFFLUENT	1.347	22.50	16.00	5.00	
3	42 % EFFLUENT	1.412	27.50	16.00	5.00	
4	56 % EFFLUENT	1.412	27.50	16.00	5.00	
5	75 % EFFLUENT	1.379	25.00	16.00	5.00	
6	100 % EFFLUENT	1.412	27.50	16.00	5.00	

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

Pimephales promelas **FATHEAD MINNOW** TEST 1000.0

WEIGHT DATA FOR LARVAL SURVIVAL AND GROWTH TEST

LAB # / #s:	K1409004
CLIENT:	Wynne
ANALYSTS:	KP
SAMPLE ID:	

TEST DATES (BEGIN / END):	9/9/14 - 9/16/14
WEIGHING DATE / TIME:	9/17/2014
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	1.01753	1.01203	0.00550	10	0.550	AVG DRY
	B	0.98417	0.97842	0.00575	10	0.575	WEIGHT (mg)
MHS	C	1.00921	1.00366	0.00555	10	0.555	0.533
	D	0.97702	0.97248	0.00454	10	0.454	CV
	E	1.01084	1.00553	0.00531	10	0.531	8.79
CONC:	A	0.98705	0.98225	0.00480	10	0.480	AVG DRY
	B	0.98639	0.98064	0.00575	10	0.575	WEIGHT (mg)
32%	C	0.97498	0.96936	0.00562	10	0.562	0.597
	D	0.98999	0.98300	0.00699	10	0.699	CV
	E	0.98171	0.97501	0.00670	10	0.670	
CONC:	A	1.00627	0.99959	0.00668	10	0.668	AVG DRY
	B	0.99302	0.98773	0.00529	10	0.529	WEIGHT (mg)
42%	C	0.99946	0.99417	0.00529	10	0.529	0.595
	D	0.95640	0.95063	0.00577	10	0.577	CV
	E	0.98819	0.98149	0.00670	10	0.670	
CONC:	A	0.97025	0.96509	0.00516	10	0.516	AVG DRY
	B	0.98925	0.98440	0.00485	10	0.485	WEIGHT (mg)
56%	C	1.00911	1.00375	0.00536	10	0.536	0.512
	D	1.00584	1.00076	0.00508	10	0.508	CV
	E	0.98128	0.97615	0.00513	10	0.513	
CONC:	A	1.00746	1.00125	0.00621	10	0.621	AVG DRY
	B	0.98891	0.98288	0.00603	10	0.603	WEIGHT (mg)
75%	C	1.00786	1.00155	0.00631	10	0.631	0.611
	D	1.00021	0.99370	0.00651	10	0.651	CV
	E	1.00517	0.99966	0.00551	10	0.551	
CONC:	A	1.00622	1.00091	0.00531	10	0.531	AVG DRY
	B	1.01777	1.01157	0.00620	10	0.620	WEIGHT (mg)
100%	C	0.98173	0.97567	0.00606	10	0.606	0.587
	D	1.01828	1.01285	0.00543	10	0.543	CV
	E	1.02715	1.02079	0.00636	10	0.636	8.0

CV = (STANDARD DEVIATION/MEAN)*100

REMARKS:

AA# K1409004, FATHEAD MINNOW GROWTH CHRONIC, 9-9-14
File: C:\COPYTO~1\TOXSTAT\FHGROWTH. Transform: ARC SINE(SQUARE ROOT(Y))

Shapiro - Wilk's test for normality

D = 0.079

W = 0.987

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# K1409004, FATHEAD MINNOW GROWTH CHRONIC, 9-9-14
File: C:\COPYTO~1\TOXSTAT\FHGROWTH. Transform: ARC SINE(SQUARE ROOT(Y))

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 8.97

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# K1409004, FATHEAD MINNOW GROWTH CHRONIC, 9-9-14
FILE: C:\COPYTO~1\TOXSTAT\FHGROWTH.
TRANSFORM: ARC SINE(SQUARE ROOT(Y)) NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	0.5500	0.8355
1	CONTROL	2	0.5750	0.8607
1	CONTROL	3	0.5550	0.8405
1	CONTROL	4	0.4540	0.7393
1	CONTROL	5	0.5310	0.8164
2	32 % EFFLUENT	1	0.4800	0.7654
2	32 % EFFLUENT	2	0.5750	0.8607
2	32 % EFFLUENT	3	0.5620	0.8476
2	32 % EFFLUENT	4	0.6990	0.9901
2	32 % EFFLUENT	5	0.6700	0.9589
3	42 % EFFLUENT	1	0.6680	0.9567
3	42 % EFFLUENT	2	0.5290	0.8144
3	42 % EFFLUENT	3	0.5290	0.8144
3	42 % EFFLUENT	4	0.5770	0.8627
3	42 % EFFLUENT	5	0.6700	0.9589
4	56 % EFFLUENT	1	0.5160	0.8014

4	56 % EFFLUENT	2	0.4850	0.7704
4	56 % EFFLUENT	3	0.5360	0.8214
4	56 % EFFLUENT	4	0.5080	0.7934
4	56 % EFFLUENT	5	0.5130	0.7984
5	75 % EFFLUENT	1	0.6210	0.9076
5	75 % EFFLUENT	2	0.6030	0.8891
5	75 % EFFLUENT	3	0.6310	0.9179
5	75 % EFFLUENT	4	0.6510	0.9388
5	75 % EFFLUENT	5	0.5510	0.8365
6	100 % EFFLUENT	1	0.5310	0.8164
6	100 % EFFLUENT	2	0.6200	0.9066
6	100 % EFFLUENT	3	0.6060	0.8922
6	100 % EFFLUENT	4	0.5430	0.8285
6	100 % EFFLUENT	5	0.6360	0.9231

AA# K1409004, FATHEAD MINNOW GROWTH CHRONIC, 9-9-14
File: C:\COPYTO~1\TOXSTAT\FHGROWTH. Transform: ARC SINE(SQUARE ROOT(Y))

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.042	0.008	2.536
Within (Error)	24	0.079	0.003	
Total	29	0.121		

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

AA# K1409004, FATHEAD MINNOW GROWTH CHRONIC, 9-9-14
File: C:\COPYTO~1\TOXSTAT\FHGROWTH. 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	0.818	0.533		
2	32 % EFFLUENT	0.885	0.597	-1.818	
3	42 % EFFLUENT	0.881	0.595	-1.733	
4	56 % EFFLUENT	0.797	0.512	0.591	
5	75 % EFFLUENT	0.898	0.611	-2.189	
6	100 % EFFLUENT	0.873	0.587	-1.511	

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

AA# K1409004, FATHEAD MINNOW GROWTH CHRONIC, 9-9-14
File: C:\COPYTO~1\TOXSTAT\FHGROWTH. 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	0.086	16.1	-0.064
3	42 % EFFLUENT	5	0.086	16.1	-0.062
4	56 % EFFLUENT	5	0.086	16.1	0.021
5	75 % EFFLUENT	5	0.086	16.1	-0.078
6	100 % EFFLUENT	5	0.086	16.1	-0.054

AA# K1409004, FATHEAD MINNOW GROWTH CHRONIC, 9-9-14
File: C:\COPYTO~1\TOXSTAT\FHGROWTH. Transform: ARC SINE(SQUARE ROOT(Y))

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	0.818				
2	32 % EFFLUENT	0.885	34.50	16.00	5.00	
3	42 % EFFLUENT	0.881	32.00	16.00	5.00	
4	56 % EFFLUENT	0.797	21.00	16.00	5.00	
5	75 % EFFLUENT	0.898	38.00	16.00	5.00	
6	100 % EFFLUENT	0.873	33.50	16.00	5.00	

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

APPENDIX D

Ceriodaphnia dubia Raw Data and Statistics

SURVIVAL AND REPRODUCTION TEST

Ceriodaphnia dubia

Discharger: Wynne | **Lab Number/s** | **Analyst: RH**

Location: Outfall 001 | ***K1409004*** | **Test Start - Date/Time: 9-9-14, 1500**

Date Sample Collected: 9 - 8/10/12 - 14 | | **Test Stop - Date/Time: 9-16-14, 1400**

Conc	1	Replicate										No. of Young	No. of Adult	Young /Adult	Analyst
%	Day	A	B	C	D	E	F	G	H	I	J				
MHS	1	0	0	0	0	0	0	0	0	0	0	0	10	0.0	RH
	2	0	0	0	0	0	0	0	0	0	0	0	10	0.0	RH
	3	0	0	0	1	0	0	0	2	0	0	3	10	0.3	RH
	4	0	0	1	0	2	0	3	3	0	4	13	10	1.3	RH
	5	6	3	5	4	8	5	3	2	6	2	44	10	4.4	RH
	6	5	0	6	7	1	12	6	8	6	5	56	10	5.6	RH
	7	8	10	0	1	5	5	2	5	4	2	42	10	4.2	RH
	8														
	Total	19	13	12	13	16	22	14	20	16	13	158		Avg. =	15.8
														C.V. =	21.9

Conc	2	Replicate										No. of Young	No. of Adult	Young /Adult	Analyst
%	Day	A	B	C	D	E	F	G	H	I	J				
32.0%	1	0	0	0	0	0	0	0	0	0	0	0	10	0.0	RH
	2	0	0	0	0	0	0	0	0	0	0	0	10	0.0	RH
	3	1	0	0	0	1	0	0	0	2	0	4	10	0.4	RH
	4	1	0	1	0	1	1	1	0	0	6	11	10	1.1	RH
	5	4	7	0	4	5	1	4	3	7	2	37	10	3.7	RH
	6	5	8	6	5	8	7	6	13	5	0	63	10	6.3	RH
	7	5	3	0	3	0	7	0	5	1	7	31	10	3.1	RH
	8														
	Total	16	18	7	12	15	16	11	21	15	15	146		Avg. =	14.6
														C.V. =	26.5

Conc	3	Replicate										No. of Young	No. of Adult	Young /Adult	Analyst
%	Day	A	B	C	D	E	F	G	H	I	J				
42.0%	1	0	0	0	0	0	0	0	0	0	0	0	10	0.0	RH
	2	0	0	0	0	0	0	0	0	0	0	0	10	0.0	RH
	3	0	0	0	0	0	0	0	0	0	0	0	10	0.0	RH
	4	2	0	2	2	0	1	2	3	0	1	13	10	1.3	RH
	5	3	3	3	6	3	0	7	2	4	5	36	10	3.6	RH
	6	7	0	11	2	6	5	10	3	6	0	50	10	5.0	RH
	7	5	3	4	5	7	4	0	2	8	5	43	10	4.3	RH
	8														
	Total	17	6	20	15	16	10	19	10	18	11	142		Avg. =	14.2
														C.V. =	32.8

Conc	4	Replicate										No. of Young	No. of Adult	Young /Adult	Analyst
%	Day	A	B	C	D	E	F	G	H	I	J				
56.0%	1	0	0	0	0	0	0	0	0	0	0	0	10	0.0	RH
	2	0	0	0	0	0	0	0	0	0	0	0	10	0.0	RH
	3	0	0	0	2	0	0	0	0	0	0	2	10	0.2	RH
	4	1	1	2	0	1	1	2	0	1	1	10	10	1.0	RH
	5	3	4	0	3	6	5	4	3	3	3	34	10	3.4	RH
	6	4	5	12	8	7	6	9	1	0	11	63	10	6.3	RH
	7	5	0	6	2	7	0	6	5	8	3	42	10	4.2	RH
	8														
	Total	13	10	20	15	21	12	21	9	12	18	151		Avg. =	15.1
														C.V. =	30.3

Conc	5	Replicate										No. of Young	No. of Adult	Young /Adult	Analyst
%	Day	A	B	C	D	E	F	G	H	I	J				
75.0%	1	0	0	0	0	0	0	0	0	0	0	0	10	0.0	RH
	2	0	0	0	0	0	0	0	0	0	0	0	10	0.0	RH
	3	1	0	0	0	1	0	0	0	0	0	2	10	0.2	RH
	4	0	1	0	0	0	0	0	0	3	0	4	10	0.4	RH
	5	3	4	5	1	6	4	6	3	0	0	32	10	3.2	RH
	6	5	7	8	5	0	8	7	5	6	8	59	10	5.9	RH
	7	5	6	5	8	12	0	5	6	7	7	61	10	6.1	RH
	8														
	Total	14	18	18	14	19	12	18	14	16	15	158		Avg. =	15.8
														C.V. =	14.9

Conc	6	Replicate										No. of Young	No. of Adult	Young /Adult	Analyst
%	Day	A	B	C	D	E	F	G	H	I	J				
100.0%	1	0	0	0	0	0	0	0	0	0	0	0	10	0.0	RH
	2	0	0	0	0	0	0	0	0	0	0	0	10	0.0	RH
	3	0	0	2	0	0	0	0	0	0	1	3	10	0.3	RH
	4	0	0	0	0	0	4	4	0	1	1	10	10	1.0	RH
	5	5	4	4	8	2	3	4	0	3	3	36	10	3.6	RH
	6	0	5	10	6	8	7	0	9	7	7	59	10	5.9	RH
	7	7	6	5	5	7	5	10	7	5	5	62	10	6.2	RH
	8														
	Total	12	15	21	19	17	19	18	16	16	17	170		Avg. =	17.0
														C.V. =	14.7

AA # K1409004, C.DUBIA CHRONIC, REPRODUCION, 9-9-14
File: C:\COPYTO~1\TOXSTAT\C.DUB 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 # K1409004, C.DUBIA CHRONIC, REPRODUCION, 9-9-14
File: C:\COPYTO~1\TOXSTAT\C.DUB Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 6.89

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%	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	NUMBER OF 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

IDENTIFICATION	NUMBER OF ALIVE	NUMBER OF 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	0	
4	75%	10	0	
5	100%	10	0	

TITLE: AA # K1409004, C.DUBIA CHRONIC, REPRODUCION, 9-9-14
FILE: C:\COPYTO~1\TOXSTAT\C.DUB
TRANSFORM: NO TRANSFORMATION NUMBER OF GROUPS: 6

GRP	IDENTIFICATION	REP	VALUE	TRANS VALUE
1	CONTROL	1	19.0000	19.0000
1	CONTROL	2	13.0000	13.0000
1	CONTROL	3	12.0000	12.0000
1	CONTROL	4	13.0000	13.0000
1	CONTROL	5	16.0000	16.0000
1	CONTROL	6	22.0000	22.0000
1	CONTROL	7	14.0000	14.0000
1	CONTROL	8	20.0000	20.0000
1	CONTROL	9	16.0000	16.0000
1	CONTROL	10	13.0000	13.0000
2	32 % EFFLUENT	1	16.0000	16.0000
2	32 % EFFLUENT	2	18.0000	18.0000
2	32 % EFFLUENT	3	7.0000	7.0000
2	32 % EFFLUENT	4	12.0000	12.0000
2	32 % EFFLUENT	5	15.0000	15.0000
2	32 % EFFLUENT	6	16.0000	16.0000
2	32 % EFFLUENT	7	11.0000	11.0000
2	32 % EFFLUENT	8	21.0000	21.0000
2	32 % EFFLUENT	9	15.0000	15.0000
2	32 % EFFLUENT	10	15.0000	15.0000
3	42 % EFFLUENT	1	17.0000	17.0000
3	42 % EFFLUENT	2	6.0000	6.0000
3	42 % EFFLUENT	3	20.0000	20.0000
3	42 % EFFLUENT	4	15.0000	15.0000
3	42 % EFFLUENT	5	16.0000	16.0000
3	42 % EFFLUENT	6	10.0000	10.0000
3	42 % EFFLUENT	7	19.0000	19.0000
3	42 % EFFLUENT	8	10.0000	10.0000
3	42 % EFFLUENT	9	18.0000	18.0000
3	42 % EFFLUENT	10	11.0000	11.0000
4	56 % EFFLUENT	1	13.0000	13.0000
4	56 % EFFLUENT	2	10.0000	10.0000
4	56 % EFFLUENT	3	20.0000	20.0000
4	56 % EFFLUENT	4	15.0000	15.0000
4	56 % EFFLUENT	5	21.0000	21.0000
4	56 % EFFLUENT	6	12.0000	12.0000
4	56 % EFFLUENT	7	21.0000	21.0000
4	56 % EFFLUENT	8	9.0000	9.0000

4	56 % EFFLUENT	9	12.0000	12.0000
4	56 % EFFLUENT	10	18.0000	18.0000
5	75 % EFFLUENT	1	14.0000	14.0000
5	75 % EFFLUENT	2	18.0000	18.0000
5	75 % EFFLUENT	3	18.0000	18.0000
5	75 % EFFLUENT	4	14.0000	14.0000
5	75 % EFFLUENT	5	19.0000	19.0000
5	75 % EFFLUENT	6	12.0000	12.0000
5	75 % EFFLUENT	7	18.0000	18.0000
5	75 % EFFLUENT	8	14.0000	14.0000
5	75 % EFFLUENT	9	16.0000	16.0000
5	75 % EFFLUENT	10	15.0000	15.0000
6	100 % EFFLUENT	1	12.0000	12.0000
6	100 % EFFLUENT	2	15.0000	15.0000
6	100 % EFFLUENT	3	21.0000	21.0000
6	100 % EFFLUENT	4	19.0000	19.0000
6	100 % EFFLUENT	5	17.0000	17.0000
6	100 % EFFLUENT	6	19.0000	19.0000
6	100 % EFFLUENT	7	18.0000	18.0000
6	100 % EFFLUENT	8	16.0000	16.0000
6	100 % EFFLUENT	9	16.0000	16.0000
6	100 % EFFLUENT	10	17.0000	17.0000

AA # K1409004, C.DUBIA CHRONIC, REPRODUCION, 9-9-14
File: C:\COPYTO~1\TOXSTAT\C.DUB Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	50.483	10.097	0.745
Within (Error)	54	732.100	13.557	
Total	59	782.583		

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

AA # K1409004, C.DUBIA CHRONIC, REPRODUCION, 9-9-14
File: C:\COPYTO~1\TOXSTAT\C.DUB 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	15.800	15.800		
2	32 % EFFLUENT	14.600	14.600	0.729	
3	42 % EFFLUENT	14.200	14.200	0.972	
4	56 % EFFLUENT	15.100	15.100	0.425	
5	75 % EFFLUENT	15.800	15.800	0.000	
6	100 % EFFLUENT	17.000	17.000	-0.729	

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

AA # K1409004, C.DUBIA CHRONIC, REPRODUCION, 9-9-14
File: C:\COPYTO~1\TOXSTAT\C.DUB 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	3.804	24.1	1.200
3	42 % EFFLUENT	10	3.804	24.1	1.600
4	56 % EFFLUENT	10	3.804	24.1	0.700
5	75 % EFFLUENT	10	3.804	24.1	0.000
6	100 % EFFLUENT	10	3.804	24.1	-1.200

AA # K1409004, C.DUBIA CHRONIC, REPRODUCION, 9-9-14
File: C:\COPYTO~1\TOXSTAT\C.DUB Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	RANK SUM	CRIT. VALUE	df	SIG
1	CONTROL	15.800				
2	32 % EFFLUENT	14.600	98.50	75.00	10.00	
3	42 % EFFLUENT	14.200	96.00	75.00	10.00	
4	56 % EFFLUENT	15.100	97.00	75.00	10.00	
5	75 % EFFLUENT	15.800	108.50	75.00	10.00	
6	100 % EFFLUENT	17.000	117.50	75.00	10.00	

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

APPENDIX E

Organism History

AQUATOX, INC.

416 TWIN POINTS ROAD
HOT SPRINGS, ARKANSAS 71913
501-520-0560

TEST ORGANISM HISTORY

DATE SHIPPED 9/22/14 CLIENT Ar Analytical Will

Purchase Order #: _____

SPECIES: Pimephales promelas

Quantity Shipped: 840

Age: Not fed 9/22/14

Brood Stock Source: Anderson Farms, AR

Culture Water: Groundwater

Hardness (Mg/l CaCO3): 160

Dissolved Oxygen (Mg/1): 8.1

Temperature (°C): 25.1°C

Feeding: Artemia

Comments: _____

Shipped Via: Federal Express UPS Overnight Shuttle

Packaged By: _____

Bill Hall Printers 3171

1300 Blue Spruce Drive, Suite C
Fort Collins, Colorado 80524

Toll Free: 800/331-5916
Tel:970/484-5091 Fax:970/484-2514

ORGANISM HISTORY

DATE: 11/25/2013

SPECIES: *Ceriodaphnia dubia*

AGE: > 3 day

LIFE STAGE: Adult

HATCH DATE: Variable

BEGAN FEEDING: Immediately

FOOD: YTC, *Selenastrum* sp.

Water Chemistry Record:	Current	Range
TEMPERATURE:	22°C	22-26°C
SALINITY/CONDUCTIVITY:	--	--
TOTAL HARDNESS (as $CaCO_3$):	94 mg/l	76-130 mg/l
TOTAL ALKALINITY (as $CaCO_3$):	65 mg/l	65-100 mg/l
pH:	7.98	7.50-8.20

Comments:

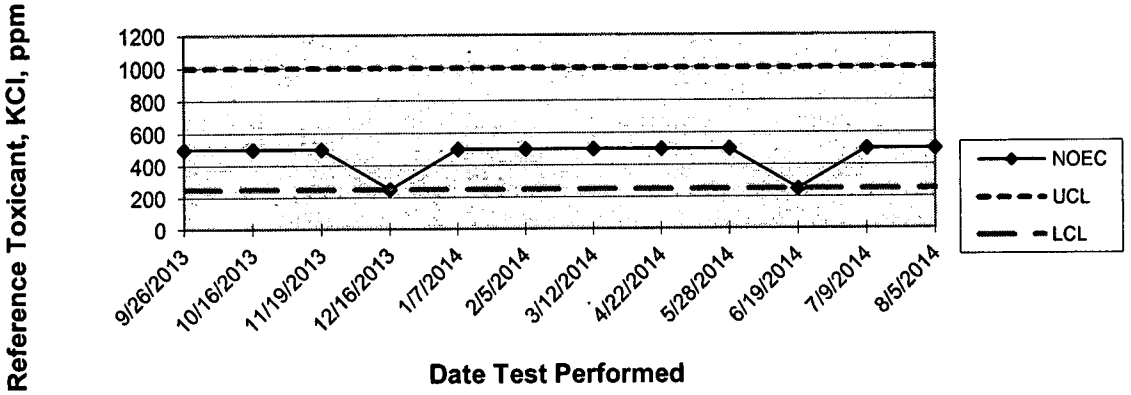
Facility Supervisor

APPENDIX F

Quality Assurance Charts

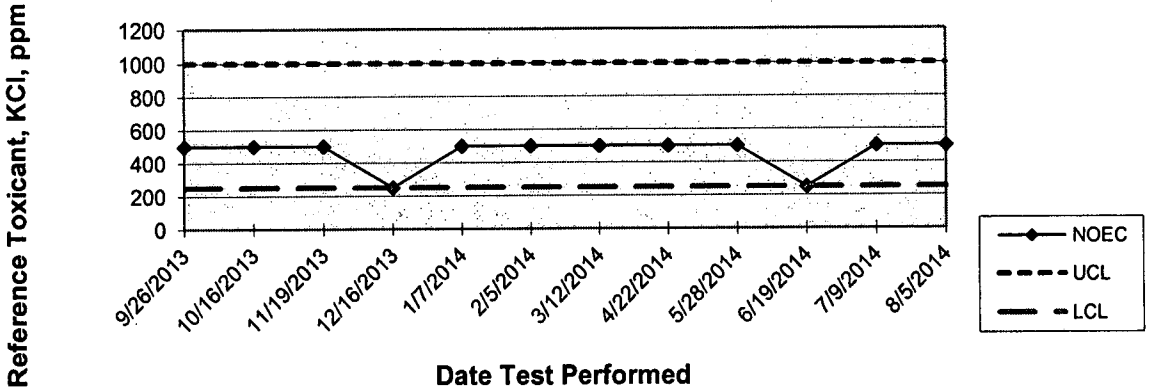
ARKANSAS ANALYTICAL, INC.

FATHEAD MINNOW SURVIVAL 7 Day
QUALITY ASSURANCE



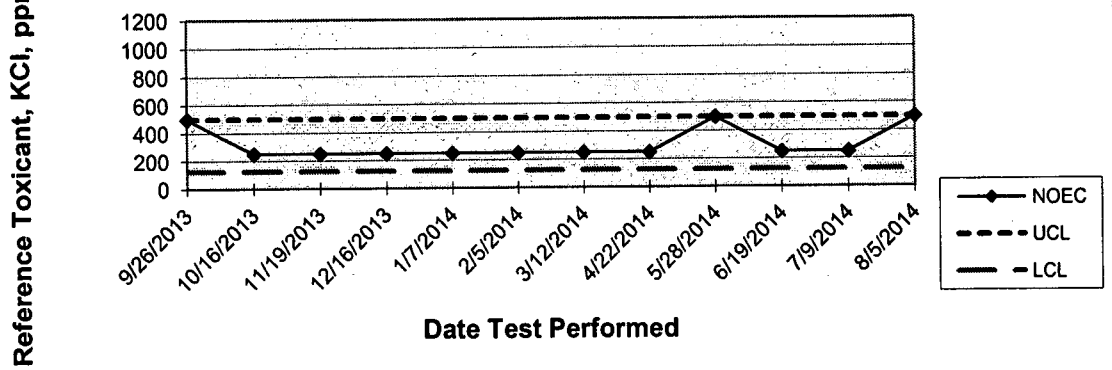
ARKANSAS ANALYTICAL, INC.

FATHEAD MINNOW GROWTH 7 Day
QUALITY ASSURANCE



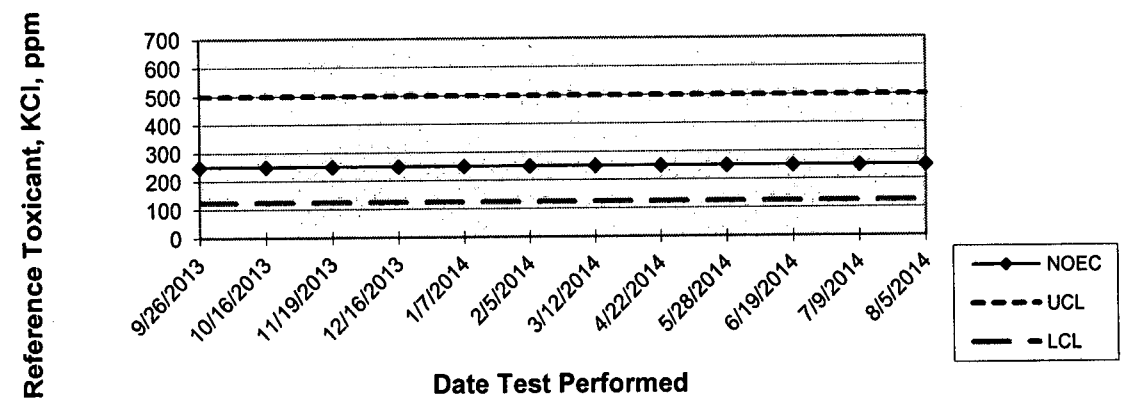
ARKANSAS ANALYTICAL, INC.

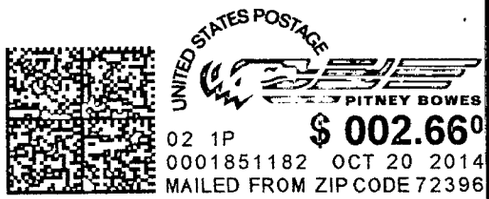
CERIODAPHNIA DUBIA SURVIVAL
QUALITY ASSURANCE



ARKANSAS ANALYTICAL, INC.

CERIODAPHNIA DUBIA REPRODUCTION
QUALITY ASSURANCE





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"Water is Life"

TO:

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