

2014
4th

Bio-Analytical Laboratories (BAL)
ADEQ Certificate #88-0630
Project X5599

Bio-Analytical Laboratories' Executive Summary

Permittee: Magnolia Wastewater System
P.O. Box 666
Magnolia, AR 71753

Project #: X5599

Outfall: 001 (treated municipal wastewater)

Permit #: AR0043613/ AFIN #14-00059

Contact: Russell Thomas

Dates: November 5 - 12, 2014

Test Type: Chronic Static Renewal Survival and Reproduction Test using *Ceriodaphnia dubia* (EPA Method 1002.0)
Chronic Static Renewal Survival and Growth Test using *Pimephales promelas* (EPA Method 1000.0)

Results:

For *Ceriodaphnia dubia*:

1. If the NOEC for survival is less than the critical dilution (100.0%), enter a "1"; otherwise, enter a "0" for Parameter TLP3B - 0 -Pass
2. If the NOEC for reproduction is less than the critical dilution, enter a "1"; otherwise, enter a "0" for Parameter TGP3B - 0 - Pass
3. Report the NOEC value for survival, Parameter TOP3B - 100.0%.
4. Report the NOEC value for reproduction, Parameter TPP3B - 100.0%.
5. Report the largest % coefficient of variation between the control and the critical dilution, Parameter TQP3B - 11.59%.

For *Pimephales promelas*:

1. If the NOEC for survival is less than the critical dilution (100.0%), enter a "1"; otherwise, enter a "0" for Parameter TLP6C - 0 -Pass
2. If the NOEC for growth is less than the critical dilution, enter a "1"; otherwise, enter a "0" for Parameter TGP6C - 0 -Pass
3. Report the NOEC value for survival, Parameter TOP6C - 100.0%.
4. Report the NOEC value for reproduction, Parameter TPP6C - 100.0%.
5. Report the largest % coefficient of variation between the control and the critical dilution, Parameter TQP6C - 6.52%.

This report contains a total of 44 pages, including this page. The results contained within pertains only to the samples listed on the chain of custody documents in Appendix A. The information meets the standards set forth by ADEQ. The chemical data in this report is for monitoring purposes only and should not be reported on discharge monitoring reports.

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Chronic Static Renewal Survival and Growth Test using *Pimephales promelas* (EPA Method 1000.0)

Results:

For *Ceriodaphnia dubia*:

1. If the NOEC for survival is less than the critical dilution (100.0%), enter a "1"; otherwise, enter a "0" for Parameter TLP3B - 0 -Pass
2. If the NOEC for reproduction is less than the critical dilution, enter a "1"; otherwise, enter a "0" for Parameter TGP3B - 0 - Pass
3. Report the NOEC value for survival, Parameter TOP3B - 100.0%.
4. Report the NOEC value for reproduction, Parameter TPP3B - 100.0%.
5. Report the largest % coefficient of variation between the control and the critical dilution, Parameter TQP3B - 11.59%.

For *Pimephales promelas*:

1. If the NOEC for survival is less than the critical dilution (100.0%), enter a "1"; otherwise, enter a "0" for Parameter TLP6C - 0 -Pass
2. If the NOEC for growth is less than the critical dilution, enter a "1"; otherwise, enter a "0" for Parameter TGP6C - 0 -Pass
3. Report the NOEC value for survival, Parameter TOP6C - 100.0%.
4. Report the NOEC value for reproduction, Parameter TPP6C - 100.0%.
5. Report the largest % coefficient of variation between the control and the critical dilution, Parameter TQP6C - 6.52%.

This report contains a total of 44 pages, including this page. The results contained within pertains only to the samples listed on the chain of custody documents in Appendix A. The information meets the standards set forth by ADEQ. The chemical data in this report is for monitoring purposes only and should not be reported on discharge monitoring reports.



Bio-Analytical Laboratories

3240 Spurgin Road
Post Office Box 527
Doyline, LA 71023

(318) 745-2772
1-800-259-1248
Fax: (318) 745-2773

THE RESULTS OF TWO CHRONIC DEFINITIVE TOXICITY TESTS FOR OUTFALL 001

AT

**MAGNOLIA WASTEWATER SYSTEM
Magnolia, Arkansas**

**NPDES #AR0043613
AFIN #14-00059**

EPA Methods 1000.0 and 1002.0

Project X5599

Test Dates: November 5 - 12, 2014

Report Date: December 29, 2014

Prepared for:
Russell Thomas
Magnolia Wastewater System
P.O. Box 666
Magnolia, AR 71753

Prepared by:
Ginger Briggs
Bio-Analytical Laboratories
P.O. Box 527
Doyline, LA 71023
ADEQ #88-0630

BAL
ADEQ #88-0630
Project X5599

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BAL
ADEQ #88-0630
Project X5599

1.0 Introduction

Bio-Analytical Laboratories (BAL), Doyline, Louisiana conducted two chronic definitive toxicity tests for Outfall 001 at Magnolia Wastewater System, Magnolia, Arkansas. The test organisms used were the cladoceran, *Ceriodaphnia dubia*, and the fathead minnow, *Pimephales promelas*. The purpose of this study is to determine if appropriately dilute effluent samples adversely affect the survival, reproduction and/or growth of the test organisms. Toxicity is defined as a statistically significant difference at the 95 percent confidence level between the survival, reproduction and/or growth of the test organism in the critical dilution (the effluent concentration representative of the proportion of effluent in the receiving water during critical low flow or critical mixing conditions) compared to the survival, reproduction and/or growth of the test organism in the control. The test endpoint is the No-Observed-Effect-Concentration (NOEC), the highest effluent concentration that is not significantly different from the control.

2.0 Methods and Materials

2.1 Test Methods

All methods followed were according to the latest edition of "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" (EPA-821-R-02-013), "Standard Methods for The Examination of Water and Wastewater. 20th Edition" (APHA 1998. Chemical results using this edition are listed in the report as SM 1997), and BAL's standard operating procedure.

2.2 Test Organisms

The *Ceriodaphnia dubia* test organisms were cultured in-house at test temperature and dilution water hardness and were less than 24 hours old at test initiation. The neonates were released within the same 8-hour period. The fathead minnow test organisms were obtained from Environmental Consulting and Testing, Superior, Wisconsin, and were less than 48 hours old at test initiation and hatched within the same 24 hour period. The minnows were acclimated to test temperature and dilution water hardness prior to test initiation. Monthly chronic reference toxicant tests were conducted in order to document organism sensitivity and demonstration of capability.

2.3 Dilution Water

Soft reconstituted water, made per method guidelines, was used as the dilution water and the control for the toxicity tests.

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Project X5599

2.4 Test Concentrations

The test concentrations used in the chronic toxicity tests were 100.0, 80.0, 56.0, 42.0 and 32.0 percent effluent and a reconstituted water control. The critical dilution was 100.0 percent effluent. The *Ceriodaphnia* test was conducted using 10 replicates of one animal each for a total of 10 animals per concentration. The fathead minnow test was conducted using five replicates of eight animals each for a total of 40 animals per concentration.

2.5 Sample Collection

Three 24-hour composite samples of Outfall 001 were collected by Magnolia personnel on November 5, 7 and 10, 2014. Upon collection and completion of each composite, the samples were packed in ice and delivered to the laboratory the day of collection by BAL personnel. The sample temperature upon arrival of each sample was 3.0, 1.8 and 2.0⁰ Celsius, respectively.

2.6 Sample Preparation

Upon arrival, the samples were logged in, given an identification number and refrigerated unless needed. Prior to use, the samples were warmed to 25±1⁰ Celsius. Total residual chlorine levels were measured with a Capital Controls^R amperometric titrator (SM 4500-Cl D 1997) and recorded if present. Total ammonia levels were measured using a HACH^R test strip. Dissolved oxygen (SM 4500-0 G 1997) and pH (SM 4500-H+ B 1997) measurements were measured on the control and each concentration at test initiation, at test renewal and at test termination. Conductivity (SM 2510 B 1997) measurements were also taken at test initiation and at each renewal. Alkalinity (SM 2320 B 1997) and hardness (SM 2340 C 1997) levels were measured on the control and the undiluted effluent samples.

2.7 Monitoring of the Tests

The cladoceran test was run in a Precision^R dual-programmable, illuminated incubator at a temperature of 25±1⁰ Celsius. The fathead minnow test was run in a circulating waterbath, using a Remcor^R heated liquid circulator to keep a constant temperature of 25±1⁰ Celsius. AEMC^R data-loggers were used to monitor diurnal test temperature. Test temperatures were recorded at the beginning of the day, after test renewal and at the end of the day. Light cycles and intensities were recorded twice a month.

2.8 Data Analysis

Ceriodaphnia dubia survival data was analyzed using Fisher's Exact Test, an equality test comparing concentration data to control data. Reproduction data was analyzed using Steel's Many-One Rank Test, a non-parametric test comparing concentration data to control data.

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ADEQ #88-0630
Project X5599

Fathead minnow survival data was analyzed using Steel's Many-One Rank Test, while the growth data was analyzed using Dunnett's Test, a parametric test comparing concentration data to control data. The chronic endpoints in the reference toxicant tests were obtained by approved EPA methods of analysis.

3.0 Results and Discussion

The results of the *Ceriodaphnia dubia* test can be found in Table 1. One hundred percent survival occurred in the control and in the critical dilution after seven days of exposure. The average number of neonates per female after three broods in the control was 21.6 and the average in the critical dilution was 22.8. The No-Observed-Effect-Concentration (NOEC) for survival and reproduction in this test was 100.0 percent effluent (p=.05).

The fathead minnow test results can be found in Table 2. Ninety-seven-point-five percent survival occurred in the control and 100.0 percent survival occurred in the critical dilution after seven days of exposure. The average weight gained in the control was 0.945 milligram (mg) and the average weight gained in the critical dilution was 0.850 mg. A non-true dose response occurred in the biomass data. After further review, it was determine that the NOEC for survival and growth in this test was 100.0 percent effluent (p=.05).

See Appendix C, Statistical Analyses, for further information.

Table 1: Results of the Chronic Definitive *Ceriodaphnia dubia* Test

Percent Effluent	Percent Survival	Sig.*	Mean # Neonates-Surviving	Mean # Neonates -Total	Sig.*
Control	100.0		21.6	21.6	
32.0	90.0		20.8	18.7	
42.0	100.0		22.8	22.8	
56.0	100.0		23.0	23.0	
80.0	100.0		22.0	22.0	
100.0	100.0		22.8	22.8	

*significant when compared to the control (p=.05). Test validity based on mean number of neonates per surviving female. NOEC value based on total mean number of neonates.

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Table 2: Results of the Chronic Definitive Fathead Minnow Test

Percent Effluent	Percent Survival	Sig.*	Mean Dry Weight (mg)	Sig.*
Control	97.5		0.945/0.970+	
32.0	97.5		0.883	
42.0	97.5		0.785	*
56.0	92.5		0.775	*
80.0	97.5		0.798	*
100.0	100.0		0.850	

*significant when compared to the control (p=.05).+Test validity based on mean dry weight per surviving larvae in the control.

The chronic reference toxicant tests conducted this month showed the test organisms to be within the respective sensitivity range. The graphs of the results of the chronic reference toxicant tests can be found in Appendix D- Quality Assurance Charts.

4.0 Conclusions

The three composite samples of Outfall 001 collected on November 5, 7 and 10, 2014, from Magnolia Wastewater System, Magnolia, Arkansas, were not found to be lethally toxic to the fathead minnow test organisms nor the *Ceriodaphnia dubia* test organisms in the 100.0 percent critical dilution after seven days of exposure, respectively (p=.05). Sub-lethal effects (i.e. lack of growth or reproduction) were not noted in the critical dilution in either test (p=.05).

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ADEQ #88-0630
Project X5599

5.0 References

- EPA, 2002. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Fourth Edition. EPA-821-R-02-013, Office of Water.
- EPA, 2000. Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination System. EPA-833-R-00-003, Office of Wastewater Management.
- EPA, 2000. Method Guidance and Recommendations for Whole Effluent (WET) Testing. EPA-821-B-00-04, Office of Water
- APHA, 1998. Standard Methods for The Examination of Water and Wastewater. 20th Edition.

APPENDIX A
CHAIN-OF-CUSTODY DOCUMENTS



Bio-Analytical Laboratories

3240 Spurgin Road
 Post Office Box 527
 Orytha, LA 71023
 (510) 745-2772
 (510) 745-1246
 Fax: (510) 745-2773

NELAP/LELAP 01975, ADEQ 88-0630, TCEQ T104704278

Laboratory Use Only:

Company: City of Magnolia		Phone: (870) 234-2955		Analysis:				Project Number: X5599	
Address: P.O. Box 666, Magnolia, AR 71753		Fax: (870) 234-2203		Chronic Ceriodaphnia Chronic minnow Acute minnow/fresh/marine) Acute Daphnia species Acute Mysid Acute Ceriodaphnia Fecal Coliform				Temp. upon arrival: 3.0°C Thermometer #: 29 Tech: RC Date: 11/5/14 Lab Control Number: RC 11/5/14 Preservative: (below) ice C9960	
Permit #: AR0043613/AFIN 14-00059		Purchase Order:							
Sampler's Signature/Printed Name/Affiliation: David Richards mwms									
Date Start Date End	Time Start Time End	C	G	# and type of container	Sample Identification				
11/14/14 11/5/14	7:00 2:00	X		6 half gallons	001		X	X	
Relinquished by/Affiliation: David Richards mwms				Date: 11/5/14	Time: 0940	Received by/Affiliation: [Signature]		Date: 11/5/14	Time: 0940
Relinquished by/Affiliation:				Date:	Time:	Received by/Affiliation:		Date:	Time:
Relinquished by/Affiliation: [Signature]				Date: 11/5/14	Time: 1145	Received by/Affiliation: R. Cullen		Date: 11/5/14	Time: 1145
Method of Shipment: <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Bus <input type="checkbox"/> Fed Ex <input type="checkbox"/> DHL <input type="checkbox"/> UPS <input type="checkbox"/> Client <input type="checkbox"/> Other Tracking # _____									
Comments:									
COC Rev. 3.0									



Bio-Analytical Laboratories

3240 Saurin Road
Post Office Box 927
Doyline, LA 71029

(910) 745-2772
1-800-255-1246
Fax: (910) 745-2773

NRLAP/LELAP 01975, ADEQ 88-0630, TCEQ T104704278

Laboratory Use Only:

Company: City of Magnolia		Phone: (870) 234-2955		Analysis:				Project Number: X5599 Temp. upon arrival: 1,8°C Therm # 29 EOB 11/7/14 Preservative: (below) Ice				
Address: P.O. Box 666, Magnolia, AR 71753		Fax: (870) 234-2203		Chronic Ceriodaphnia	Chronic minnow	Acute minnow (fresh/marine)	Acute Daphnia species		Acute Mysid	Acute Ceriodaphnia	Fecal Coliform	
Permit #: AR0043613/AFIN 14-00059		Purchase Order:										
Sampler's Signature/Printed Name/Affiliation: David Richards mwws												Lab Control Number: C9983
Date Start Date End	Time Start Time End	C	G					# and type of container				
11/6/14 11/9/14	7:50 2:50	X		6 half gallons	001	X	X				C9983	
Relinquished by/Affiliation: David Richards mwws				Date: 11/9/14	Time: 0925	Received by/Affiliation: J By		Date: 11/9/14	Time: 0925			
Relinquished by/Affiliation:				Date:	Time:	Received by/Affiliation:		Date:	Time:			
Relinquished by/Affiliation: J By				Date: 11/9/14	Time: 1215	Received by/Affiliation: Cheryl B...		Date: 11/7/14	Time: 1245			
Method of Shipment: <input type="checkbox"/> Lab <input type="checkbox"/> Bus <input type="checkbox"/> Fed Ex <input type="checkbox"/> DHL <input type="checkbox"/> UPS <input type="checkbox"/> Client <input type="checkbox"/> Other Tracking # _____												
Comments:												
COC Rev. 3.0												



Bio-Analytical Laboratories

3240 Spurgin Road
Post Office Box 527
Doyle, LA 71022

(510) 745-2772
1-800-225-1046
Fax: (510) 745-3773

NELAP/LELAP 01975, ADEQ 88-0630, TCRQ T104704278

Laboratory Use Only:

Company: City of Magnolia		Phone: (870) 234-2955		Analysis:				Project Number: X5599 Temp. upon arrival: 20°C Therm 29 EGB 11/10/14 Preservative: (below) ice			
Address: P.O. Box 666, Magnolia, AR 71753		Fax: (870) 234-2203		Chronic Ceriodaphnia	Chronic minnow	Acute minnow/fresh/marine)	Acute Daphnia species		Acute Mysid	Acute Ceriodaphnia	Fecal Coliform
Permit #: AR0043613/AFIN 14-00059		Purchase Order:									
Sampler's Signature/Printed Name/Affiliation: <i>David Richards</i> David Richards mwws											
Date Start Date End	Time Start Time End	C	G	# and type of container	Sample Identification					Lab Control Number:	
7/9/14 7/10/14	7:00 7:00	X		6 half gallons	001	X	X				C0987
11/9/14 11/10/14											
Relinquished by/Affiliation: <i>David Richards</i> mwws				Date: 11/10/14	Time: 0730	Received by/Affiliation: <i>[Signature]</i>		Date: 11/10/14	Time: 0930		
Relinquished by/Affiliation:				Date:	Time:	Received by/Affiliation:		Date:	Time:		
Relinquished by/Affiliation: <i>[Signature]</i>				Date: 11/10/14	Time: 1230	Received by/Affiliation: <i>[Signature]</i>		Date: 11/10/14	Time: 1230		
Method of Shipment: <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Bus <input type="checkbox"/> Fed Ex <input type="checkbox"/> DHL <input type="checkbox"/> UPS <input type="checkbox"/> Client <input type="checkbox"/> Other Tracking # _____											
Comments: <i>Ⓢ On bottles EGB 11/10/14</i>											

EGB
11/10/14

APPENDIX B
RAW DATA SHEETS

BIO-ANALYTICAL LABORATORIES CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION TEST

Project# X5599 Date start: 11/5/14 Date end: 11/12/14

Client/Contact: MAGN/Magnolia Waste Water
 Address: P.O. Box 666 Magnolia AR 71753
 NPDES#: AR0043613
 Sample Description: 001 Dilution Water: Soft Reconstituted
 Test Temperature(°C) 25+1° Technicians: EGB/AN/RC EB 11/14

Adults isolated: Date 11/4/14 Time: 2230

Neonates collected: Date 11/5/14 Time: 0615 Board: 217s

Dissolved Oxygen Meter: Model YSI55D Serial #06E2089 AU
 pH Meter: Model Orion 230A+ Serial #105253
 Conductivity Meter: Model Control Company Serial# 80277924
 Amperometric Titrator: Model Fischer-Porter Serial # 92W445766

Effluent	Aerate?/Minutes	Receiving Water	Aerate?/Minutes
Initial D.O.	/Final D.O.	Initial D.O.	/Final D.O.
(mg/L & %)/Tech	(mg/L & %)/Tech	(mg/L & %)/Tech	(mg/L & %)/Tech

0. <u>10.6</u> / <u>126.1%</u> / <u>RC</u>	0. <u>Y</u> / <u>15</u> / <u>8.2</u> / <u>96.5%</u> / <u>RC</u>	0. _____
1. <u>10.5</u> / <u>129.9%</u> / <u>EB</u>	1. <u>Y</u> / <u>15</u> / <u>7.9</u> / <u>95.5%</u> / <u>EB</u>	1. _____
2. <u>11.0</u> / <u>133.2%</u> / <u>EB</u>	2. <u>Y</u> / <u>15</u> / <u>8.5</u> / <u>100.0%</u> / <u>EB</u>	2. _____
3. <u>10.6</u> / <u>124.8%</u> / <u>EB</u>	3. <u>Y</u> / <u>15</u> / <u>8.3</u> / <u>97.3%</u> / <u>EB</u>	3. _____
4. <u>10.6</u> / <u>126.9%</u> / <u>EB</u>	4. <u>Y</u> / <u>15</u> / <u>8.1</u> / <u>96.3%</u> / <u>EB</u>	4. _____
5. <u>10.4</u> / <u>138.0%</u> / <u>EB</u>	5. <u>Y</u> / <u>15</u> / <u>7.5</u> / <u>94.3%</u> / <u>EB</u>	5. _____
6. <u>11.1</u> / <u>131.7%</u> / <u>RC</u>	6. <u>Y</u> / <u>20</u> / <u>8.0</u> / <u>95.1%</u> / <u>RC</u>	6. _____
7. _____	7. _____	7. _____

<u>Total Residual Chlorine(mg/L)/Tech</u>	<u>Dechlorinated? Amount?/Tech</u>	<u>Ammonia (NH3) (mg/L)/Tech</u>	<u>BAL Sample # Date in Use</u>
1. <u><0.01/RC</u>	1. <u>No/RC</u>	1. <u>0.25/RC</u>	1. <u>C9960</u> <u>11/5/14</u>
2. <u><0.01/EB</u>	2. <u>No/EB</u>	2. <u>0.0/EB</u>	2. <u>C9986</u> <u>11/5/14</u> <u>C9988</u> <u>11/11/14</u>
3. <u><0.01/RC</u>	3. <u>No/RC</u>	3. <u>1.0/RC</u>	3. <u>C9987</u> <u>11/11/14</u>

Comments:

BIO-ANALYTICAL LABORATORIES
NUMBER NEONATES PER BROOD CERIODAPHNIA

Project # X5599 Test Dates 11/5/14 - 11/12/14

Client City of Magnolia

Replicate	% Concentration								
	0	32	42	56	80	100			
A	17 ^{RE} 17	21 22	14	14	17	22			
B	23	20	23	21	29	24			
C	24	23	25	20	26	22			
D	25	19	20	24	23	22			
E	23	20	26	25	28	21			
F	22	23	28	21	26	24			
G	18	18	22	23	24	26			
H	21	23	25	23	13	22			
I	21	X	15	29	14	20			
J	22	20	30	30	20	25			
Surviving Mean	21.6	20.8	22.8	23.0	22.0	22.8			
Total Mean	21.6	18.7	22.8	23.0	22.0	22.8			
CV%*	11.59	8.93	22.91	19.87	26.07	8.22			

*coefficient of variation = standard deviation x 100/mean (calculation based on young of the surviving adults)

Key: M=male; X=dead adult

Calculated by: RC 11/12/14

Calculations checked by: EGB 11/25/14

BIO-ANALYTICAL LABORATORIES

CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION TEST-LIVE NEONATE PRODUCTION

X5599

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Project# X5599

Test started: Date 11/5/14 Time 1555

Client Magnolia

Test ended: Date 11/21/14 Time 1455

Technician: Day 0 RC 1 EGS 2 RC 3 EGS 4 EGS 5 RC 6 EGS 7 RC 8

Time: Day 0 1555 1 1000 2 1105 3 1040 4 1040 5 1350 6 1430 7 1435 8

Temp. (°C): Day 0 25.0 1 25.02 2 25.0 3 25.0 4 25.6 5 25.0 6 25.07 7 25.0 8

Conc ‰	Day	A	B	C	D	E	F	G	H	I	J	Number of Live Adults	
0.5	1	0										10	
	2	0										10	
	3	0										10	
	4	0	4	4	4	3	M	2	2	0	0	10	
	5	0	1	0	0	0	0	0	1	7	1	10	
	6	0	8	8	8	8	0	0	8	12	6	10	
	7	0	10	12	13	11	9	11	10	0	12	10	
	8	0											10
32.0	1	0										10	
	2	0										10	
	3	0										10	
	4	0	2	3	2	3	4	4	2	X	3	9	
	5	0	3	4	0	0	0	0	0	1	6	9	
	6	0	10	14	12	9	11	11	9	9	11	9	
	7	0											10
	8	0											10
42.0	1	0										10	
	2	0										10	
	3	0										10	
	4	0	5	3	4	4	3	5	2	2	4	10	
	5	0	5	0	0	0	0	0	4	1	0	10	
	6	0	12	10	10	13	16	9	9	9	12	10	
	7	0											10
	8	0											10
56.0	1	0										10	
	2	0										10	
	3	0										10	
	4	0	5	3	3	4	2	2	2	4	2	10	
	5	0	6	0	0	0	0	0	0	0	1	10	
	6	0	13	10	10	13	16	9	9	9	13	10	
	7	0	10	9	11	11	13	14	13	13	14	10	
	8	0											10
75.0	1	0										10	
	2	0										10	
	3	0										10	
	4	0	5	3	2	3	3	5	3	4	3	10	
	5	0	0	1	0	0	0	0	0	0	0	10	
	6	0	12	10	10	12	10	8	9	10	8	10	
	7	0	12	12	9	13	13	11	1	0	9	10	
	8	0											10
80.0	1	0										10	
	2	0										10	
	3	0										10	
	4	0	3	6	5	3	5	5	2	3	2	10	
	5	0	0	0	0	0	0	0	1	0	1	10	
	6	0	10	6	7	9	10	10	8	8	9	10	
	7	0	12	13	10	10	9	9	11	11	9	13	10
	8	0											10
100.0	1	0										10	
	2	0										10	
	3	0										10	
	4	0	3	6	5	3	5	5	2	3	2	10	
	5	0	0	0	0	0	0	0	1	0	1	10	
	6	0	10	6	7	9	10	10	8	8	9	10	
	7	0	12	13	10	10	9	9	11	11	9	13	10
	8	0											10

wrong RC dilution 11/14

Key: X=dead adult, Xⁿ=adult had n neonates before death, M=male CER102 Rev.2.0

BIO-ANALYTICAL LABORATORIES CHRONIC WATER QUALITY DATA (CHR CHEM Rev. 2.0)
 Project# X5599 Test started: Date 11/14 Time 1555
 Client magnolia Test ended: Date 11/14 Time 1455
 Organism C. dubia

Day/# water used	1	2	3	4	5	6	7	8
Concentration: Control	Soft							
pH	7.2	7.4	7.3	7.3	7.4	7.3	7.3	7.3
DO (mg/l)	8.1	8.4	8.1	8.6	8.5	8.5	8.4	8.0
Cond (umhos/cm)	178.1	178.9	178.7	181.1	182.8	179.9	186.1	
Alkalinity (mg/L)	28.0							
Hardness (mg/L)	48.6							
Concentration: 32.0								
pH	7.4	7.3	7.4	7.6	7.3	7.5	7.3	7.2
DO (mg/l)	8.2	8.4	8.1	8.5	8.4	8.2	8.3	8.0
Cond (umhos/cm)	282	279	283	286	284	271	254	
Concentration: 42.0								
pH	7.5	7.4	7.4	7.5	7.4	7.5	7.3	7.2
DO (mg/l)	8.2	8.3	8.0	8.2	8.3	8.1	8.3	8.0
Cond (umhos/cm)	313	306	310	314	307	295	274	
Concentration: 56.0								
pH	7.5	7.4	7.6	7.5	7.4	7.3	7.4	7.2
DO (mg/l)	8.1	8.2	8.0	8.2	8.3	8.1	8.3	8.0
Cond (umhos/cm)	356	351	354	352	367	335	300	
Concentration: 80.0								
pH	7.6	7.6	7.5	7.5	7.4	7.4	7.5	7.3
DO (mg/l)	8.1	8.1	8.2	8.5	8.3	8.1	8.2	7.9
Cond (umhos/cm)	428	426	432	427	432	409	350	
Concentration: 100.0								
pH	7.7	7.5	7.6	7.5	7.4	7.4	7.5	7.3
DO (mg/l)	8.1	8.0	8.2	8.1	8.2	8.1	8.1	7.9
Cond (umhos/cm)	488	491	497	495	491	512	391	
Tech-prerenewal	-	EGB	RC	EGB	EGB	RC	EGB	RC
Tech-postrenewal	RC	EGB	EGB	EGB	EGB	EGB	RC	
Alkalinity (mg/l)	72.0		48.0		80.0			
Hardness (mg/l)	78.0		80.0		68.0			

Key: prerenewal/postrenewal

BIO-ANALYTICAL LABORATORIES
PIMEPHALES PROMELAS SURVIVAL AND GROWTH DATA SHEET

Project# X5599 Date started: 11/5/14 Date ended 11/12/14

Client/Contact MAGN/Magnolia Waste Water

Address P.O. Box 666 Magnolia AR 71753

NPDES# AR0043613 AFIN14-00059

Sample Description 001 Dilution Water Soft Reconstituted

Test Temperature(°C) 25+1° Celsius Technicians EGB/AH/RC ^{EGB 11/4}

Test organism age <48 hrs Vendor/ID# ECT/802

Feeding Times

Day	Technician/Time/Amount (per replicate)		
	AM	NOON	PM
0			RC/1810/0.10ml RC 11/5/14
1	EGB/0845/0.10ml	EGB/1100/0.10ml	EGB/1655/0.10ml
2	EGB/0700/0.10ml	RC/1110/0.10ml	EGB/1450/0.10ml
3	EGB/0820/0.20ml		EGB/1450/0.20ml
4	EGB/0900/0.20ml		EGB/1610/0.20ml
5	EGB/0700/0.10ml	RC/1130/0.10ml	EGB/1620/0.10ml
6	EGB/0715/0.10ml	EGB/1130/0.10ml	RC/1605/0.10ml

Dissolved Oxygen Meter: Model YSI55D Serial #06E2089 AU
 pH Meter: Model Orion 230A+ Serial #105253
 Conductivity Meter: Model Control Company Serial #80277924
 Amperometric Titrator: Model Fischer-Porter Serial #92W445766

Effluent Initial DO(mg/L&%) /Tech	Aerate?/Minutes /Final DO (mg/L & %)/Tech	Receiving Water Initial DO (mg/L & %)/Tech	Aerate?/Minutes /Final DO (mg/L & %)/Tech
0. 10.6/126.1%/RC	0. Y/15/8.2/96.5%/RC		0. _____
1. 10.5/129.9%/EGB	1. Y/15/7.9/95.5%/EGB		1. _____
2. 11.0/133.2%/RC	2. Y/15/8.5/100.0%/RC		2. _____
3. 10.6/124.8%/EGB	3. Y/15/8.3/97.3%/EGB		3. _____
4. 10.6/126.9%/EGB	4. Y/15/8.1/96.3%/EGB		4. _____
5. 10.4/138.0%/EGB	5. Y/15/7.5/94.3%/EGB		5. _____
6. 11.1/131.7%/RC	6. Y/20/8.0/95.1%/RC		6. _____

Total Residual Chlorine(mg/L)/Tech	Dechlorinated? Amount?/Tech	Ammonia (NH3) (mg/L)/Tech	BAL Sample # Date in use
1. <0.01/RC	1. No/RC	1. 0.25/RC	1. C9960 11/5/14
2. <0.01/EGB	2. No/EGB	2. 0.0/EGB	2. C9986 11/8/14
3. <0.01/RC	3. No/RC	3. 1.0/RC	3. C9987 11/11/14

Comments:

BIO-ANALYTICAL LABORATORIES 7-DAY CHRONIC MINNOW SURVIVAL DATA

Project# X5599 Test started: Date 11/14/94 Time 1620
 Client Magnolia Test ended: Date 11/21/94 Time 0740
 Technician: Day 0 RC 1 EGS 2 RC 3 EGS 4 EGS 5 RC 6 RC 7 EGS
 Time: Day 0 1620 1 1040 2 1000 3 0815 4 0650 5 1110 6 1335 7 0740
 Temperature Day 0 25.0 1 25.0 2 25.0 3 25.0 4 25.0 5 25.0 6 25.0 7 25.0

0% Conc.	Rep.	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
0%	A	8	8	8	8	8	8	8	8
	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
32.0	A	8	8	8	8	8	8	8	8
	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
42.0	A	8	8	8	8	8	8	8	8
	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
56.0	A	8	8	8	8	8	8	8	8
	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
80.0	A	8	8	8	8	8	8	8	8
	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
100.0	A	8	8	8	8	8	8	8	8
	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

Minnow2

BIO-ANALYTICAL LABORATORIES MINNOW LARVAL GROWTH DATA SHEET (Minnow3 Rev 2.0)

Project#/Client: X5599 magnolia Temp Start (°C): 108.0 Tech: ECB Date: 11/21/14 Time: 0740 5599
 Temp End (°C): 110.0 Tech: ECB Date: 11/21/14 Time: 0030 Page 20 of 44

Conc.	Replicate/ Pan number	Wt. of pan(g)/ Date weighed: Tech:	Wt. of pan + larvae(g)/ Date weighed: Tech:	Total wt. of larvae (g)	Original # of larvae at test initiation	Mean Dry wt. of larvae (mg)	Mean Dry wt. - surviving larvae (mg) Control Only*
0	A 56	0.9371	0.9452	0.0081	8	1.013	
	B 57	0.9411	0.9483	0.0072	8	0.900	
	C 58	0.9344	0.9415	0.0071	8	0.9238	
	D 59	0.9344	0.9422	0.0078	8	0.915	
	E 60	0.9349	0.9427	0.0078	8	0.975	
32	A 61	0.9357	0.9419	0.0062	8	0.775	
	B 62	0.9384	0.9450	0.0066	8	0.825	
	C 63	0.9360	0.9440	0.0074	8	0.925	
	D 64	0.9368	0.9442	0.0074	8	0.925	
	E 65	0.9360	0.9437	0.0077	8	0.963	
42	A 66	0.9362	0.9427	0.0065	8	0.813	
	B 67	0.9403	0.9454	0.0051	8	0.638	
	C 68	0.9436	0.9495	0.0059	8	0.738	
	D 69	0.9440	0.9517	0.0077	8	0.963	
	E 70	0.9429	0.9491	0.0062	8	0.775	
56	A 71	0.9390	0.9444	0.0054	8	0.675	
	B 72	0.9383	0.9441	0.0058	8	0.725	
	C 73	0.9375	0.9448	0.0073	8	0.913	
	D 74	0.9364	0.9426	0.0062	8	0.775	
	E 75	0.9395	0.9458	0.0063	8	0.788	
80	A 76	0.9405	0.9463	0.0058	8	0.725	
	B 77	0.9410	0.9476	0.0066	8	0.825	
	C 78	0.9399	0.9467	0.0068	8	0.850	
	D 79	0.9393	0.9451	0.0058	8	0.725	
	E 80	0.9398	0.9467	0.0069	8	0.863	
100	A 81	0.9470	0.9532	0.0062	8	0.775	
	B 82	0.9476	0.9540	0.0070	8	0.875	
	C 83	0.9416	0.9484	0.0068	8	0.850	
	D 84	0.9440	0.9512	0.0072	8	0.900	
	E 85	0.9462	0.9490	0.0068	8	0.850	

Initial weight
of #58 hard
to read. Should
be 0.9346

* Test acceptance of control weight based on surviving larvae at end of test.
 Calculated by: RC 11/21/14 Calculations checked by: ECB 12/1/14

BIO-ANALYTICAL LABORATORIES CHRONIC WATER QUALITY DATA (CHR CHEM Rev. 2.0)
 Project# X5599 Test started: Date 1/14/94 Time 1626
 Client magnolia Test ended: Date 1/14/94 Time 0740
 Organism P. promelas

Day/# water used	0/1/67	1	2	3	4	5	6	7	8
Concentration: Control									
pH	7.2	7.0 7.3	6.8 7.3	6.9 7.3	6.9 7.4	6.6 7.3	6.6 7.3	6.9	
DO (mg/l)	8.1	7.8 8.1	5.6 8.6	5.5 8.5	4.8 8.5	4.7 8.5	5.1 8.0	5.9	
Cond (umhos/cm)	178.1	178.9	178.7	181.1	182.8	179.9	186.1		
Alkalinity (mg/L)	28.0								
Hardness (mg/L)	48.0								
Concentration: 32.0									
pH	7.4	7.0 7.4	6.8 7.4	6.7 7.3	6.7 7.3	6.1 7.4	6.7 7.3	6.7	
DO (mg/l)	8.2	7.1 8.1	5.7 8.5	5.5 8.4	4.9 8.4	4.6 8.1	4.9 8.0	5.9	
Cond (umhos/cm)	282	279	283	286	284	271	254		
Concentration: 42.0									
pH	7.5	7.0 7.5	6.7 7.4	6.8 7.4	6.7 7.3	6.1 7.4	6.7 7.3	6.7	
DO (mg/l)	8.2	7.0 8.0	5.5 8.5	5.4 8.3	5.1 8.3	4.7 8.1	5.1 8.0	5.9	
Cond (umhos/cm)	313	300	310	314	307	295	274		
Concentration: 56.0									
pH	7.5	7.0 7.6	6.8 7.6	6.8 7.4	6.7 7.3	6.7 7.5	6.8 7.4	6.7	
DO (mg/l)	8.1	7.0 8.0	5.6 8.5	5.5 8.3	4.9 8.3	4.8 7.9	5.2 8.0	5.8	
Cond (umhos/cm)	356	351	354	352	367	335	300		
Concentration: 80.0									
pH	7.6	7.1 7.6	6.9 7.5	6.9 7.4	6.7 7.4	6.8 7.6	6.9 7.4	6.7	
DO (mg/l)	8.1	7.0 7.9	5.7 8.5	5.5 8.3	5.0 8.2	5.0 7.8	5.0 7.9	5.9	
Cond (umhos/cm)	428	420	432	427	432	409	350		
Concentration: 100.0									
pH	7.7	7.2 7.7	7.0 7.7	6.9 7.4	6.8 7.4	6.9 7.6	6.9 7.4	6.8	
DO (mg/l)	8.1	7.1 7.9	5.8 8.4	5.1 8.2	5.2 8.1	5.1 7.5	5.1 7.9	6.1	
Cond (umhos/cm)	488	496	497	495	496	512	391		
Tech-prerenewal	-	ECB	RC	ECB	ECB	RC	RC	ECB	
Tech-postrenewal	RC	ECB	RC	ECB	ECB	ECB	RC	-	
Alkalinity (mg/l)	72.0		48.0		80.0				
Hardness (mg/l)	78.0		80.0		68.0				

Key: prerenewal/postrenewal

APPENDIX C
STATISTICAL ANALYSES

Ceriodaphnia Survival and Reproduction Test-7 Day Survival

X5599

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Start Date: 11/5/2014 Test ID: X5599CD Sample ID: AR0043613
 End Date: 11/12/2014 Lab ID: 880630 Sample Type: EFF1-POTW
 Sample Date: 11/4/2014 Protocol: EPAFW02-EPA/821/R-02-01 Test Species: CD-Ceriodaphnia dubia

Comments:

Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
32	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000
42	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
56	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
80	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000

Conc-%	Mean	N-Mean	Resp	Not Resp	Total	N	Fisher's Exact P	1-Tailed Critical
D-Control	1.0000	1.0000	0	10	10	10		
32	0.9000	0.9000	1	9	10	10	0.5000	0.0500
42	1.0000	1.0000	0	10	10	10	1.0000	0.0500
56	1.0000	1.0000	0	10	10	10	1.0000	0.0500
80	1.0000	1.0000	0	10	10	10	1.0000	0.0500
100	1.0000	1.0000	0	10	10	10	1.0000	0.0500

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	100	>100		1
Treatments vs D-Control				

Ceriodaphnia Survival and Reproduction Test-Reproduction

X5599
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Start Date: 11/5/2014 Test ID: X5599CD Sample ID: AR0043613
 End Date: 11/12/2014 Lab ID: 880630 Sample Type: EFF1-POTW
 Sample Date: 11/4/2014 Protocol: EPAFW02-EPA/821/R-02-01 Test Species: CD-Ceriodaphnia dubia

Comments:

Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	17.000	23.000	24.000	25.000	23.000	22.000	18.000	21.000	21.000	22.000
32	21.000	20.000	23.000	19.000	20.000	23.000	18.000	23.000	20.000	
42	14.000	23.000	25.000	20.000	26.000	28.000	22.000	25.000	15.000	30.000
56	14.000	21.000	20.000	24.000	25.000	21.000	23.000	23.000	29.000	30.000
80	17.000	29.000	26.000	23.000	28.000	26.000	24.000	13.000	14.000	20.000
100	22.000	24.000	22.000	22.000	21.000	24.000	26.000	22.000	20.000	25.000

Conc-%	Mean	N-Mean	Transform: Untransformed					N	Rank Sum	1-Tailed Critical
			Mean	Min	Max	CV%				
D-Control	21.600	1.0000	21.600	17.000	25.000	11.589	10			
32	20.778	0.9619	20.778	18.000	23.000	8.932	9	78.50	61.00	
42	22.800	1.0556	22.800	14.000	30.000	22.912	10	118.00	74.00	
56	23.000	1.0648	23.000	14.000	30.000	19.871	10	115.00	74.00	
80	22.000	1.0185	22.000	13.000	29.000	26.068	10	113.00	74.00	
100	22.800	1.0556	22.800	20.000	26.000	8.218	10	116.50	74.00	

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.05)	1.0028	0.895	-0.4995	0.47492
Bartlett's Test indicates unequal variances (p = 1.46E-03)	19.6386	15.0863		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Wilcoxon Rank Sum Test	100	>100		1
Treatments vs D-Control				

Ceriodaphnia Survival and Reproduction Test-Reproduction

X5599

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Start Date: 11/5/2014 Test ID: X5599CD Sample ID: AR0043613
 End Date: 11/12/2014 Lab ID: 880630 Sample Type: EFF1-POTW
 Sample Date: 11/4/2014 Protocol: EPAFW02-EPA/821/R-02-01 Test Species: CD-Ceriodaphnia dubia
 Comments:

Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	17.000	23.000	24.000	25.000	23.000	22.000	18.000	21.000	21.000	22.000
32	21.000	20.000	23.000	19.000	20.000	23.000	18.000	23.000	0.000	20.000
42	14.000	23.000	25.000	20.000	26.000	28.000	22.000	25.000	15.000	30.000
56	14.000	21.000	20.000	24.000	25.000	21.000	23.000	23.000	29.000	30.000
80	17.000	29.000	26.000	23.000	28.000	26.000	24.000	13.000	14.000	20.000
100	22.000	24.000	22.000	22.000	21.000	24.000	26.000	22.000	20.000	25.000

Conc-%	Mean	N-Mean	Transform: Untransformed				N	Rank Sum	1-Tailed Critical
			Mean	Min	Max	CV%			
D-Control	21.600	1.0000	21.600	17.000	25.000	11.589	10		
32	18.700	0.8857	18.700	0.000	23.000	36.361	10	88.50	75.00
42	22.800	1.0556	22.800	14.000	30.000	22.912	10	118.00	75.00
56	23.000	1.0648	23.000	14.000	30.000	19.871	10	115.00	75.00
80	22.000	1.0185	22.000	13.000	29.000	26.068	10	113.00	75.00
100	22.800	1.0556	22.800	20.000	26.000	8.218	10	116.50	75.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution ($p \leq 0.05$)	1.28586	0.895	-1.4383	3.86147
Bartlett's Test indicates unequal variances ($p = 3.91E-03$)	17.3323	15.0863		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	100	>100		1
Treatments vs D-Control				

Ceriodaphnia Survival and Reproduction Test-Reproduction

X5599

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Start Date: 11/5/2014 Test ID: X5599CD Sample ID: AR0043613
 End Date: 11/12/2014 Lab ID: 880630 Sample Type: EFF1-POTW
 Sample Date: 11/4/2014 Protocol: EPAFW02-EPA/821/R-02-01 Test Species: CD-Ceriodaphnia dubia

Comments:

Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	17.000	23.000	24.000	25.000	23.000	22.000	18.000	21.000	21.000	22.000
32	21.000	20.000	23.000	19.000	20.000	23.000	18.000	23.000	0.000	20.000
42	14.000	23.000	25.000	20.000	26.000	28.000	22.000	25.000	15.000	30.000
56	14.000	21.000	20.000	24.000	25.000	21.000	23.000	23.000	29.000	30.000
80	17.000	29.000	26.000	23.000	28.000	26.000	24.000	13.000	14.000	20.000
100	22.000	24.000	22.000	22.000	21.000	24.000	26.000	22.000	20.000	25.000

Conc-%	Mean	N-Mean	Transform: Untransformed					N	1-Tailed		
			Mean	Min	Max	CV%	t-Stat		Critical	MSD	
D-Control	21.600	1.0000	21.600	17.000	25.000	11.589	10				
32	18.700	0.8657	18.700	0.000	23.000	36.361	10	1.357	2.287	4.888	
42	22.800	1.0556	22.800	14.000	30.000	22.912	10	-0.561	2.287	4.888	
56	23.000	1.0648	23.000	14.000	30.000	19.871	10	-0.655	2.287	4.888	
80	22.000	1.0185	22.000	13.000	29.000	26.068	10	-0.187	2.287	4.888	
100	22.800	1.0556	22.800	20.000	26.000	8.218	10	-0.561	2.287	4.888	

Auxiliary Tests	Statistic	Critical	Skew	Kurt						
Kolmogorov D Test indicates non-normal distribution (p <= 0.05)	1.28586	0.895	-1.4383	3.86147						
Bartlett's Test indicates unequal variances (p = 3.91E-03)	17.3323	15.0863								
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	100	>100		1	4.88794	0.22629	26.2567	22.8463	0.34608	5, 54
Treatments vs D-Control										

Ceriodaphnia Survival and Reproduction Test-Reproduction

X5599
Page 27 of 44

Start Date: 11/5/2014	Test ID: X5599CD	Sample ID: AR0043613
End Date: 11/12/2014	Lab ID: 880630	Sample Type: EFF1-POTW
Sample Date: 11/4/2014	Protocol: EPAFW02-EPA/821/R-02-01	Test Species: CD-Ceriodaphnia dubia

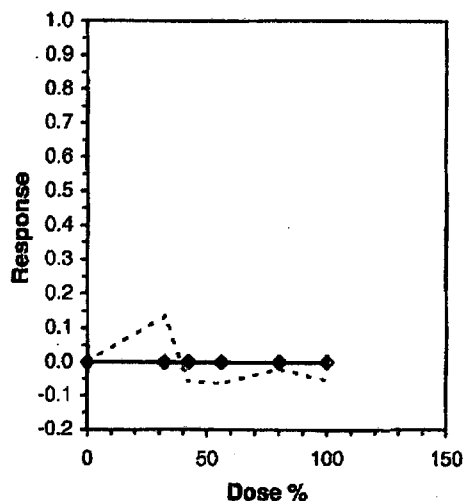
Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	17.000	23.000	24.000	25.000	23.000	22.000	18.000	21.000	21.000	22.000
32	21.000	20.000	23.000	19.000	20.000	23.000	18.000	23.000	0.000	20.000
42	14.000	23.000	25.000	20.000	26.000	28.000	22.000	25.000	15.000	30.000
56	14.000	21.000	20.000	24.000	25.000	21.000	23.000	23.000	29.000	30.000
80	17.000	29.000	26.000	23.000	28.000	26.000	24.000	13.000	14.000	20.000
100	22.000	24.000	22.000	22.000	21.000	24.000	26.000	22.000	20.000	25.000

Conc-%	Transform: Untransformed							Isotonic	
	Mean	N-Mean	Mean	Min	Max	CV%	N	Mean	N-Mean
D-Control	21.600	1.0000	21.600	17.000	25.000	11.589	10	21.817	1.0000
32	18.700	0.8657	18.700	0.000	23.000	36.361	10	21.817	1.0000
42	22.800	1.0556	22.800	14.000	30.000	22.912	10	21.817	1.0000
56	23.000	1.0648	23.000	14.000	30.000	19.871	10	21.817	1.0000
80	22.000	1.0185	22.000	13.000	29.000	26.068	10	21.817	1.0000
100	22.800	1.0556	22.800	20.000	26.000	8.218	10	21.817	1.0000

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.05)	1.28586	0.895	-1.4383	3.86147
Bartlett's Test indicates unequal variances (p = 3.91E-03)	17.3323	15.0863		

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL	Skew
IC05	>100			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



Larval Fish Growth and Survival Test-7 Day Survival

X5599

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Start Date: 11/5/2014 Test ID: X5599PP Sample ID: AR0043813
 End Date: 11/12/2014 Lab ID: T104704278 Sample Type: EFF1-POTW
 Sample Date: 11/4/2014 Protocol: EPAFW02-EPA/821/R-02-01 Test Species: PP-Pimephales promelas

Comments:

Conc-%	1	2	3	4	5
D-Control	1.0000	1.0000	0.8750	1.0000	1.0000
32	0.8750	1.0000	1.0000	1.0000	1.0000
42	1.0000	0.8750	1.0000	1.0000	1.0000
56	0.7500	0.8750	1.0000	1.0000	1.0000
80	1.0000	1.0000	1.0000	0.8750	1.0000
100	1.0000	1.0000	1.0000	1.0000	1.0000

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root					N	Rank Sum	1-Tailed Critical
			Mean	Min	Max	CV%				
D-Control	0.9750	1.0000	1.3564	1.2094	1.3931	6.055	5			
32	0.9750	1.0000	1.3564	1.2094	1.3931	6.055	5	27.50	16.00	
42	0.9750	1.0000	1.3564	1.2094	1.3931	6.055	5	27.50	16.00	
56	0.9250	0.9487	1.2872	1.0472	1.3931	12.116	5	24.50	16.00	
80	0.9750	1.0000	1.3564	1.2094	1.3931	6.055	5	27.50	16.00	
100	1.0000	1.0256	1.3931	1.3931	1.3931	0.000	5	30.00	16.00	

Auxillary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.76458	0.927	-1.4039	1.42639
Equality of variance cannot be confirmed				
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	100	>100		1
Treatments vs D-Control				

Larval Fish Growth and Survival Test-7 Day Growth

X5599-
Page 29 of 44

Start Date: 11/5/2014 Test ID: X5599PP Sample ID: AR0043813
 End Date: 11/12/2014 Lab ID: T104704278 Sample Type: EFF1-POTW
 Sample Date: 11/4/2014 Protocol: EPAFW02-EPA/821/R-02-01 Test Species: PP-Pimephales promelas

Comments:

Conc-%	1	2	3	4	5
D-Control	1.0125	0.9000	0.8625	0.9750	0.9750
32	0.7750	0.8250	0.9250	0.9250	0.9625
42	0.8125	0.6375	0.7375	0.9625	0.7750
56	0.6750	0.7250	0.9125	0.7750	0.7875
80	0.7250	0.8250	0.8500	0.7250	0.8625
100	0.7750	0.8750	0.8500	0.9000	0.8500
0-SN	1.0125	0.9000	0.9857	0.9750	0.9750

Conc-%	Mean	N-Mean	Transform: Untransformed				CV%	N	t-Stat	1-Tailed Critical	MSD	% RPD
			Mean	Min	Max							
D-Control	0.9450	1.0000	0.9450	0.8625	1.0125	6.521	5					
32	0.8825	0.9339	0.8825	0.7750	0.9625	8.936	5	1.299	2.409	0.1159	6.56 (<12.0%)	
*42	0.7850	0.8307	0.7850	0.6375	0.9625	15.123	5	3.326	2.409	0.1159		
*56	0.7750	0.8201	0.7750	0.6750	0.9125	11.462	5	3.534	2.409	0.1159		
*80	0.7975	0.8439	0.7975	0.7250	0.8625	8.470	5	3.066	2.409	0.1159		
100	0.8500	0.8995	0.8500	0.7750	0.9000	5.502	5	1.975	2.409	0.1159	10.1% (<12.0)	
0-SN	0.9696	1.0261	0.9696	0.9000	1.0125	4.315	5	-0.512	2.409	0.1159	10.0% (<12.0)	

Auxiliary Tests	Statistic	Critical	Skew	Kurt		
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.9715	0.934	0.17609	0.34328		
Bartlett's Test indicates equal variances (p = 0.46)	5.6758	16.8119				
Hypothesis Test (1-tail, 0.05)	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test indicates no significant differences Treatments vs D-Control	0.11587	0.12261	0.03048	0.00579	9.7E-04	6, 28

NOEC = 100.0%

Larval Fish Growth and Survival Test-7 Day Biomass

X5599
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Start Date: 11/5/2014 Test ID: X5599PP Sample ID: AR0043613
 End Date: 11/12/2014 Lab ID: T104704278 Sample Type: EFF1-POTW
 Sample Date: 11/4/2014 Protocol: EPAFW02-EPA/821/R-02-01 Test Species: PP-Pimephales promelas
 Comments:

Conc-%	1	2	3	4	5
D-Control	1.0125	0.9000	0.8625	0.9750	0.9750
32	0.7750	0.8250	0.9250	0.9250	0.9625
42	0.8125	0.6375	0.7375	0.9625	0.7750
56	0.6750	0.7250	0.9125	0.7750	0.7875
80	0.7250	0.8250	0.8500	0.7250	0.8625
100	0.7750	0.8750	0.8500	0.9000	0.8500

Conc-%	Mean	N-Mean	Transform: Untransformed				N	t-Stat	1-Tailed	
			Mean	Min	Max	CV%			Critical	MSD
D-Control	0.9450	1.0000	0.9450	0.8625	1.0125	6.521	5			
32	0.8825	0.9339	0.8825	0.7750	0.9625	8.936	5	1.230	2.360	0.1200
*42	0.7850	0.8307	0.7850	0.6375	0.9625	15.123	5	3.148	2.360	0.1200
*56	0.7750	0.8201	0.7750	0.6750	0.9125	11.462	5	3.345	2.360	0.1200
*80	0.7975	0.8439	0.7975	0.7250	0.8625	8.470	5	2.902	2.360	0.1200
100	0.8500	0.8995	0.8500	0.7750	0.9000	5.502	5	1.869	2.360	0.1200

Auxiliary Tests	Statistic	Critical	Skew	Kurt						
Shapiro-Wilk's Test indicates normal distribution ($p > 0.05$)	0.97457	0.927	0.19962	0.1072						
Bartlett's Test indicates equal variances ($p = 0.59$)	3.71281	15.0863								
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnnett's Test Treatments vs D-Control	100	>100		1	0.11995	0.12693	0.02198	0.00646	0.01826	5, 24

Larval Fish Growth and Survival Test-7 Day Biomass

X5599
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Start Date: 11/5/2014 Test ID: X5599PP Sample ID: AR0043613
 End Date: 11/12/2014 Lab ID: T104704278 Sample Type: EFF1-POTW
 Sample Date: 11/4/2014 Protocol: EPAFW02-EPA/821/R-02-01 Test Species: PP-Pimephales promelas

Comments:

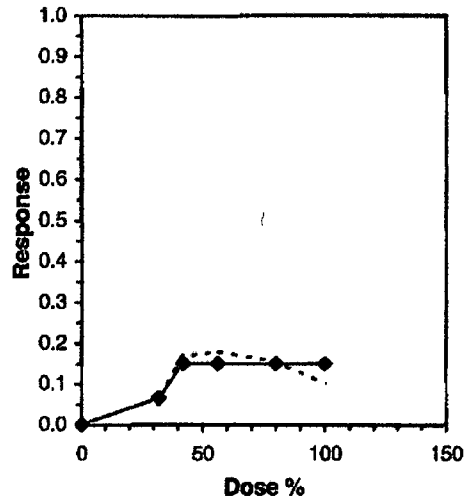
Conc-%	1	2	3	4	5
D-Control	1.0125	0.9000	0.8625	0.9750	0.9750
32	0.7750	0.8250	0.9250	0.9250	0.9625
42	0.8125	0.8375	0.7375	0.9625	0.7750
56	0.6750	0.7250	0.9125	0.7750	0.7875
80	0.7250	0.8250	0.8500	0.7250	0.8625
100	0.7750	0.8750	0.8500	0.9000	0.8500

Conc-%	Mean	N-Mean	Transform: Untransformed					Isotonic	
			Mean	Min	Max	CV%	N	Mean	N-Mean
D-Control	0.9450	1.0000	0.9450	0.8625	1.0125	6.521	5	0.9450	1.0000
32	0.8825	0.9339	0.8825	0.7750	0.9625	8.938	5	0.8825	0.9339
42	0.7850	0.8307	0.7850	0.8375	0.9625	15.123	5	0.8019	0.8485
56	0.7750	0.8201	0.7750	0.6750	0.9125	11.462	5	0.8019	0.8485
80	0.7975	0.8439	0.7975	0.7250	0.8625	8.470	5	0.8019	0.8485
100	0.8500	0.8995	0.8500	0.7750	0.9000	5.502	5	0.8019	0.8485

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.05$)	0.97457	0.927	0.19962	0.1072
Bartlett's Test indicates equal variances ($p = 0.59$)	3.71281	15.0863		

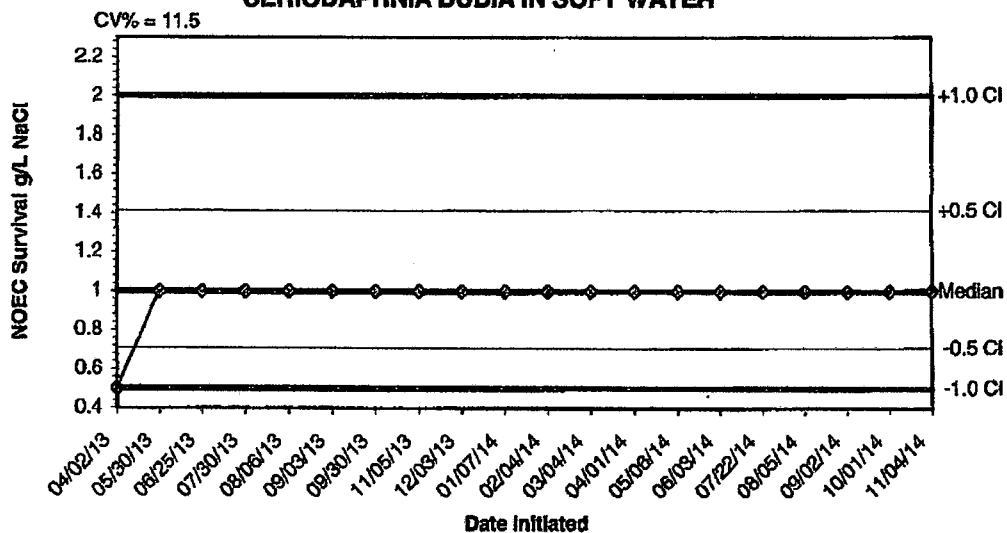
Linear Interpolation (200 Resamples)					
Point	%	SD	95% CL(Exp)	Skew	
IC05*	24.192	8.790	4.728	45.784	-0.0839
IC10	35.969				
IC15	41.829				
IC20	>100				
IC25	>100				
IC40	>100				
IC50	>100				

* indicates IC estimate less than the lowest concentration



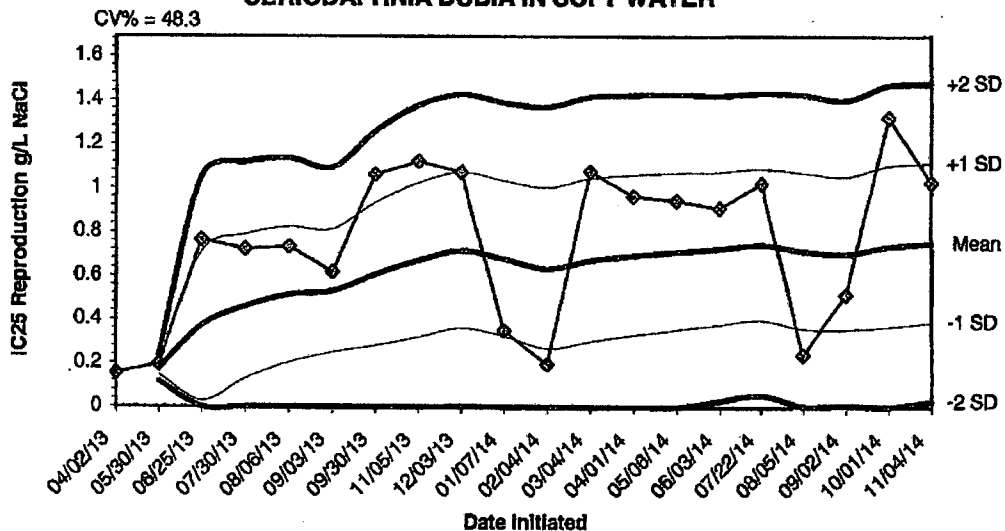
APPENDIX D
QUALITY ASSURANCE CHARTS

**2014 CHRONIC REFERENCE TOXICANT TEST RESULTS FOR
CERIODAPHNIA DUBIA IN SOFT WATER**



Dates	Values	Median	-0.5 CI	-1.0 CI	+0.5 CI	+1.0 CI
04/02/13	0.5000	1.0000	0.7071	0.5000	1.4142	2.0000
05/30/13	1.0000	1.0000	0.7071	0.5000	1.4142	2.0000
06/25/13	1.0000	1.0000	0.7071	0.5000	1.4142	2.0000
07/30/13	1.0000	1.0000	0.7071	0.5000	1.4142	2.0000
08/06/13	1.0000	1.0000	0.7071	0.5000	1.4142	2.0000
09/03/13	1.0000	1.0000	0.7071	0.5000	1.4142	2.0000
09/30/13	1.0000	1.0000	0.7071	0.5000	1.4142	2.0000
11/05/13	1.0000	1.0000	0.7071	0.5000	1.4142	2.0000
12/03/13	1.0000	1.0000	0.7071	0.5000	1.4142	2.0000
01/07/14	1.0000	1.0000	0.7071	0.5000	1.4142	2.0000
02/04/14	1.0000	1.0000	0.7071	0.5000	1.4142	2.0000
03/04/14	1.0000	1.0000	0.7071	0.5000	1.4142	2.0000
04/01/14	1.0000	1.0000	0.7071	0.5000	1.4142	2.0000
05/06/14	1.0000	1.0000	0.7071	0.5000	1.4142	2.0000
06/03/14	1.0000	1.0000	0.7071	0.5000	1.4142	2.0000
07/22/14	1.0000	1.0000	0.7071	0.5000	1.4142	2.0000
08/05/14	1.0000	1.0000	0.7071	0.5000	1.4142	2.0000
09/02/14	1.0000	1.0000	0.7071	0.5000	1.4142	2.0000
10/01/14	1.0000	1.0000	0.7071	0.5000	1.4142	2.0000
11/04/14	1.0000	1.0000	0.7071	0.5000	1.4142	2.0000

**2014 CHRONIC REFERENCE TOXICANT TEST RESULTS FOR
CERIODAPHNIA DUBIA IN SOFT WATER**



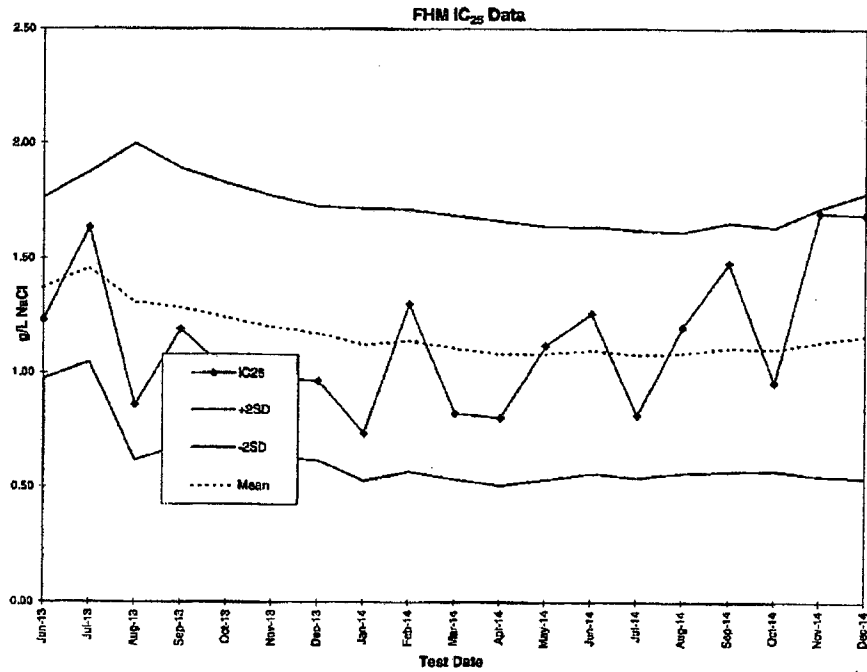
Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
04/02/13	0.1529					
05/30/13	0.1943	0.1736	0.1443	0.1151	0.2029	0.2321
06/25/13	0.7643	0.3705	0.0288	0.0000	0.7122	1.0538
07/30/13	0.7212	0.4582	0.1287	0.0000	0.7877	1.1172
08/06/13	0.7333	0.5132	0.2024	0.0000	0.8240	1.1347
09/03/13	0.6178	0.5306	0.2494	0.0000	0.8118	1.0930
09/30/13	1.0600	0.6063	0.2808	0.0000	0.9317	1.2572
11/05/13	1.1200	0.6705	0.3186	0.0000	1.0223	1.3741
12/03/13	1.0700	0.7149	0.3598	0.0048	1.0699	1.4249
01/07/14	0.3490	0.6783	0.3241	0.0000	1.0324	1.3866
02/04/14	0.1943	0.6343	0.2680	0.0000	1.0008	1.3669
03/04/14	1.0727	0.6708	0.2993	0.0000	1.0423	1.4138
04/01/14	0.9620	0.6932	0.3285	0.0000	1.0579	1.4227
05/06/14	0.9423	0.7110	0.3543	0.0000	1.0677	1.4244
06/03/14	0.9083	0.7242	0.3767	0.0292	1.0716	1.4191
07/22/14	1.0190	0.7426	0.3989	0.0552	1.0863	1.4299
08/05/14	0.2394	0.7130	0.3585	0.0041	1.0674	1.4219
09/02/14	0.5141	0.7019	0.3549	0.0079	1.0490	1.3960
10/01/14	1.3185	0.7344	0.3687	0.0029	1.1001	1.4658
11/04/14	1.0240	0.7489	0.3871	0.0253	1.1107	1.4725

Environmental Consulting and Testing, Inc.
 Fathhead Minnow Chronic RTT

12/29/2014

Test	Date	IC25	+2SD	-2SD	MEAN
1	May-13	1.51	#DIV/0!	#DIV/0!	1.51
2	Jun-13	1.23	1.77	0.97	1.37
3	Jul-13	1.64	1.87	1.04	1.46
4	Aug-13	0.86	2.00	0.62	1.31
5	Sep-13	1.19	1.89	0.68	1.28
6	Oct-13	1.01	1.83	0.65	1.24
7	Nov-13	0.98	1.77	0.63	1.20
8	Dec-13	0.96	1.73	0.62	1.17
9	Jan-14	0.73	1.72	0.53	1.12
10	Feb-14	1.30	1.71	0.57	1.14
11	Mar-14	0.82	1.69	0.53	1.11
12	Apr-14	0.80	1.66	0.51	1.09
13	May-14	1.12	1.64	0.53	1.09
14	Jun-14	1.26	1.64	0.56	1.10
15	Jul-14	0.81	1.62	0.54	1.08
16	Aug-14	1.20	1.62	0.56	1.09
17	Sep-14	1.48	1.66	0.57	1.11
18	Oct-14	0.96	1.64	0.57	1.10
19	Nov-14	1.70	1.72	0.55	1.13
20	Dec-14	1.69	1.78	0.54	1.16

sd 0.31
 cv 27%



APPENDIX E
AGENCY FORMS

**SUMMARY REPORTING FORMS
CHRONIC BIOMONITORING**

Ceriodaphnia dubia Survival and Reproduction

Permittee: City of Magnolia

NPDES No.: AR0043613/ AFIN 14-00059

	Time	Date	Time	Date
Composite 1 Collected From	0700	11/4/14 To	0700	11/5/14
Composite 2 Collected From	0700	11/6/14 To	0700	11/7/14
Composite 3 Collected From	0700	11/9/14 To	0700	11/10/14
Test initiated:	1555 am/pm		11/5/14	date
Test terminated:	1455 am/pm		11/12/14	date
Dilution water used:	Receiving		Reconstituted	

PERCENT SURVIVAL

Time of Reading	Percent Effluent					
	0	32.0	42.0	56.0	80.0	100.0
24h	100.0	100.0	100.0	100.0	100.0	100.0
48h	100.0	100.0	100.0	100.0	100.0	100.0
End of test	100.0	90.0	100.0	100.0	100.0	100.0

NUMBER OF YOUNG PRODUCED PER FEMALE @ END OF TEST

Rep	0	32.0	42.0	56.0	80.0	100.0
A	17	21	14	14	17	22
B	23	20	23	21	29	24
C	24	23	25	20	26	22
D	25	19	20	24	23	22
E	23	20	26	25	28	21
F	22	23	28	21	26	24
G	18	18	22	23	24	26
H	21	23	25	23	13	22
I	21	D	15	29	14	20
J	22	20	30	30	20	25
Surv. Mean	21.6	20.8	22.8	23.0	22.0	22.8
Total Mean	21.6	18.7	22.8	23.0	22.0	22.8
CV%*	11.59	8.93	22.91	19.87	26.07	8.22

*coefficient of variation = standard deviation x 100/mean. D=dead adult
PMSD = 22.6%

Ceriodaphnia dubia
Survival and Reproduction (cont)

1. Fisher's Exact Test:

Is the mean survival at the end of the test significantly different ($p=.05$) than the control survival for the % effluent corresponding to (lethality):

- | | | | |
|--|-----|---|----|
| a) LOW FLOW OR CRITICAL DILUTION (100.0%): | YES | X | NO |
| b) 1/2 LOW FLOW DILUTION (N/A %): | YES | | NO |

2. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate:

Is the mean number of young produced per female significantly different ($p=.05$) than the control's number of young per female for the % effluent corresponding to (significant non-lethal effects):

- | | | | |
|--|-----|---|----|
| a) LOW FLOW OR CRITICAL DILUTION (100.0%): | YES | X | NO |
| b) 1/2 LOW FLOW DILUTION (N/A %): | YES | | NO |

3. If you answered NO to 1. a) and 2. a) enter (0) otherwise enter (1): 0

4. If you answered NO to 1. b) and 2. b) enter (0) otherwise enter (1): N/A

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

6. Enter response to item 4 on DMR Form, parameter #TFP3B.

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

- | | |
|-----------------------|-----------------|
| a) NOEC survival: | 100.0% effluent |
| b) NOEC reproduction: | 100.0% effluent |
| c) LOEC survival: | N/A% effluent |
| d) LOEC reproduction: | N/A% effluent |

Bioassessing Form
Chronic Toxicity Summary Form
Ceriodaphnia dubia
Chemical Parameters Chart

Permitter: City of Magnolia
NEDES No.: AR0063613/ ARIN 14-00059
Contact: Russell Thomas
Analyst: Callahan, Briggs

Sample No. 1 Collected: Date: 11/5/14 Time: 0700
Sample No. 2 Collected: Date: 11/7/14 Time: 0700
Sample No. 3 Collected: Date: 11/10/14 Time: 0700
Test Begin: Date: 11/5/14 Time: 1635
Test End: Date: 11/12/14 Time: 1455

Dilution: 0 Day:									Dilution: 56.0 Day:								
	1	2	3	4	5	6	7	Comments		1	2	3	4	5	6	7	Comments
Temp (C)	25.0	25.0	25.0	25.0	25.0	25.0	25.0		Temp (C)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
DO Initial	8.4	8.4	8.4	8.3	8.4	8.1	8.0		DO Initial	8.2	8.2	8.2	8.1	8.1	7.9	7.9	
DO Final	8.1	8.6	8.5	8.5	8.5	8.0			DO Final	8.0	8.5	8.3	8.3	7.9	8.0		
pH Initial	7.4	7.3	7.3	7.6	7.4	7.3	7.3		pH Initial	7.4	7.4	7.5	7.3	7.4	7.3	7.3	
pH Final	7.3	7.3	7.3	7.4	7.3	7.3			pH Final	7.6	7.6	7.4	7.5	7.5	7.4		
Alkalinity	28.0								Alkalinity								
Hardness	48.0								Hardness								
Conductivity	178.9	178.7	181.1	182.8	179.9	186.1			Conductivity	351	354	352	367	335	300		
Chlorine	<.01								Chlorine								
Dilution: 32.0 Day:									Dilution: 80.0 Day:								
	1	2	3	4	5	6	7	Comments		1	2	3	4	5	6	7	Comments
Temp (C)	25.0	25.0	25.0	25.0	25.0	25.0	25.0		Temp (C)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
DO Initial	8.4	8.3	8.4	8.2	8.3	8.1	8.0		DO Initial	8.1	8.2	8.2	8.1	8.1	7.9	7.9	
DO Final	8.1	8.5	8.4	8.4	8.1	8.0			DO Final	7.9	8.5	8.3	8.2	7.8	7.9		
pH Initial	7.3	7.4	7.6	7.3	7.5	7.3	7.2		pH Initial	7.5	7.5	7.5	7.4	7.5	7.3	7.3	
pH Final	7.4	7.4	7.3	7.3	7.4	7.3			pH Final	7.4	7.5	7.4	7.4	7.6	7.4		
Alkalinity									Alkalinity								
Hardness									Hardness								
Conductivity	279	283	286	284	271	284			Conductivity	426	432	427	432	409	330		
Chlorine									Chlorine								
Dilution: 42.0 Day:									Dilution: 100.0 Day:								
	1	2	3	4	5	6	7	Comments		1	2	3	4	5	6	7	Comments
Temp (C)	25.0	25.0	25.0	25.0	25.0	25.0	25.0		Temp (C)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
DO Initial	8.3	8.2	8.3	8.1	8.2	7.9	8.0		DO Initial	8.0	8.2	8.1	8.1	8.1	7.8	7.9	
DO Final	8.0	8.5	8.3	8.3	8.1	8.0			DO Final	7.9	8.4	8.2	8.1	7.5	7.9		
pH Initial	7.4	7.4	7.5	7.4	7.5	7.3	7.2		pH Initial	7.5	7.6	7.5	7.4	7.5	7.4	7.3	
pH Final	7.5	7.4	7.4	7.3	7.4	7.3			pH Final	7.7	7.7	7.4	7.4	7.6	7.4		
Alkalinity									Alkalinity	72.0	68.0		60.0				
Hardness									Hardness	78.0	80.8		68.0				
Conductivity	306	318	314	307	295	274			Conductivity	496	497	495	496	513	391		
Chlorine									Chlorine	<.01	<.01		<.01				

**SUMMARY REPORTING FORMS CHRONIC BIOMONITORING
FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL
(Pimephales promelas)**

Permittee: City of Magnolia

NPDES No.: AR0043613/AFIN 14-00059

	Time	Date	Time	Date
Composite 1 Collected from:	0700	11/4/14	To 0700	11/5/14
Composite 2 Collected from:	0700	11/6/14	To 0700	11/7/14
Composite 3 Collected from:	0700	11/9/14	To 0700	11/10/14

Test initiated: 1620 am/pm 11/5/14 date
 Test terminated: 0740 am/pm 11/12/14 date
 Dilution water used: Receiving Reconstituted

DATA TABLE FOR SURVIVAL

Effluent Conc. %	Percent Survival in Replicate Chambers					Mean Percent Survival			CV%*
	A	B	C	D	E	24h	48h	7 days	
0	100.0	100.0	87.5	100.0	100.0	100.0	97.5	97.5	6.06
32.0	87.5	100.0	100.0	100.0	100.0	100.0	100.0	97.5	6.06
42.0	100.0	87.5	100.0	100.0	100.0	100.0	100.0	97.5	6.06
56.0	75.0	87.5	100.0	100.0	100.0	100.0	100.0	92.5	12.12
80.0	100.0	100.0	100.0	87.5	100.0	100.0	100.0	97.5	6.06
100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.00

DATA TABLE FOR GROWTH

Effluent Conc. %	Average Dry Weight in milligrams in replicate chambers					Mean Dry Weight mg	CV*
	A	B	C	D	E		
0	1.013	0.900	0.863	0.975	0.975	0.945	6.52
32.0	0.775	0.825	0.925	0.925	0.963	0.883	8.94
42.0	0.813	0.638	0.738	0.963	0.775	0.785	15.12
56.0	0.375	0.725	0.913	0.775	0.788	0.775	11.46
80.0	0.725	0.825	0.850	0.725	0.863	0.798	8.47
100.0	0.775	0.875	0.850	0.900	0.850	0.850	5.50
0-SN	1.013	0.900	0.986	0.975	0.975	0.970	4.32

*coefficient of variation = standard deviation x 100/mean.

PMSD = 12.3%

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL (cont)
(Pimephales promelas)

1. Dunnett's Procedure or Steels Many-One Rank Test as appropriate:

Is the mean survival at 7 days significantly different ($p=.05$) than the control survival for the % effluent corresponding to:

a) LOW FLOW OR CRITICAL DILUTION (100.0%)	YES	X	NO
b) 1/2 LOW FLOW DILUTION (N/A %)	YES		NO

2. Dunnett's Procedure (or appropriate test):

Is the mean dry weight (growth) at 7 days significantly different ($p=.05$) than the control's dry weight for the % effluent corresponding to (significant non-lethal effects):

a) LOW FLOW OR CRITICAL DILUTION (100.0%)	YES	X	NO
b) 1/2 LOW FLOW DILUTION (N/A %)	YES		NO

3. If you answered NO to 1. a) and 2. a) enter (0) otherwise enter (1): 0
4. If you answered NO to 1. b) and 2. b) enter (0) otherwise enter (1): N/A
5. Enter response to item 3 on DMR Form, parameter #TEP6C.
6. Enter response to item 4 on DMR Form, parameter #TFP6C.
7. Enter percent effluent corresponding to each NOEC below and circle lowest number:

a.) NOEC survival	100.0% effluent.
b.) NOEC growth	100.0% effluent.
c.) LOEC survival	N/A % effluent
d.) LOEC growth	N/A % effluent

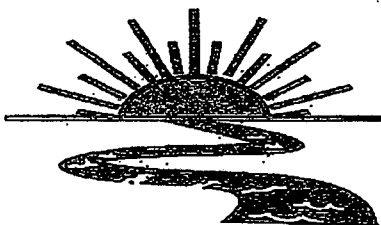
**Biomonitoring Form
Chronic Toxicity Summary Form
Phosphates promethis
Chemical Parameters Chart**

Permitter: City of Magnolia
NPDES No.: AR0043613/ AFIN 14-00029
Contact: Russell Thomas
Analyst: Briggs, Callahan

Sample No. 1 Collected: Date: 11/5/14 Time: 0700
Sample No. 2 Collected: Date: 11/7/14 Time: 0700
Sample No. 3 Collected: Date: 11/10/14 Time: 0700
Test Begin: Date: 11/5/14 Time: 1620
Test End: Date: 11/12/14 Time: 0740

Dilution: 0									Dilution: 56.0								
Day:									Day:								
	1	2	3	4	5	6	7	Comments		1	2	3	4	5	6	7	Comments
Temp (C)	25.0	25.0	25.0	25.0	25.0	25.0	25.0		Temp (C)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
DO Initial	7.2	5.6	5.5	4.8	4.7	5.1	5.9		DO Initial	7.0	5.6	5.8	4.9	4.8	5.2	5.3	
DO Final	8.1	8.6	8.5	8.5	8.5	8.0			DO Final	8.0	8.5	8.3	8.3	7.9	8.0		
pH Initial	7.0	6.8	6.9	6.9	6.6	6.6	6.9		pH Initial	7.0	6.9	6.8	6.7	6.7	6.8	6.7	
pH Final	7.3	7.3	7.3	7.4	7.3	7.3			pH Final	7.6	7.6	7.4	7.3	7.5	7.4		
Alkalinity	28.0								Alkalinity								
Hardness	48.0								Hardness								
Conductivity	178.9	178.7	181.1	182.8	179.9	186.1			Conductivity	351	354	352	367	335	360		
Chloride	<.01								Chloride								
Dilution: 32.0									Dilution: 80.0								
Day:									Day:								
	1	2	3	4	5	6	7	Comments		1	2	3	4	5	6	7	Comments
Temp (C)	25.0	25.0	25.0	25.0	25.0	25.0	25.0		Temp (C)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
DO Initial	7.1	5.7	5.3	4.9	4.6	4.9	5.9		DO Initial	7.0	5.7	5.5	5.0	5.0	5.0	5.9	
DO Final	8.1	8.5	8.4	8.4	8.1	8.0			DO Final	7.9	8.5	8.3	8.3	7.8	7.9		
pH Initial	7.0	6.8	6.7	6.7	6.7	6.7	6.7		pH Initial	7.1	6.9	6.9	6.7	6.8	6.9	6.7	
pH Final	7.4	7.4	7.3	7.3	7.4	7.3			pH Final	7.6	7.5	7.4	7.4	7.6	7.4		
Alkalinity									Alkalinity								
Hardness									Hardness								
Conductivity	279	283	286	284	271	254			Conductivity	426	432	427	432	409	350		
Chloride									Chloride								
Dilution: 42.0									Dilution: 100.0								
Day:									Day:								
	1	2	3	4	5	6	7	Comments		1	2	3	4	5	6	7	Comments
Temp (C)	25.0	25.0	25.0	25.0	25.0	25.0	25.0		Temp (C)	25.0	25.0	25.0	25.0	25.0	25.0	25.0	
DO Initial	7.0	5.3	5.4	5.1	4.8	5.1	5.9		DO Initial	7.1	5.8	5.7	5.2	5.1	5.1	6.1	
DO Final	8.0	8.5	8.3	8.3	8.1	8.0			DO Final	7.9	8.4	8.3	8.1	7.5	7.9		
pH Initial	7.0	6.7	6.8	6.7	6.7	6.7	6.7		pH Initial	7.2	7.0	6.9	6.8	6.9	6.9	6.8	
pH Final	7.5	7.4	7.4	7.3	7.4	7.3			pH Final	7.7	7.7	7.4	7.4	7.6	7.4		
Alkalinity									Alkalinity	72.0	48.0		80.0				
Hardness									Hardness	78.0	80.0		68.0				
Conductivity	306.0	318.0	314.0	307.0	283.0	274.0			Conductivity	496	497	495	496	513	391		
Chloride									Chloride	<.01	<.01		<.01				

APPENDIX F
REPORT QUALITY ASSURANCE FORM



Bio-Analytical Laboratories

3240 Spurgin Road
Post Office Box 527
Doyline, LA 71023

(318) 745-2772
1-800-259-1246
Fax: (318) 745-2773

REPORT QUALITY ASSURANCE FORM

Client: City of Magnolia, AR

Project#: X5599

Chain of Custody Documents Checked by: EGB 12/29/14
Technician/Date

Raw Data Documents Checked by: EGB 12/29/14
Technician/Date

Statistical Analysis Package Checked by: EGB 12/2/14
Quality Manager/Date

Quality Control Data Checked by: EGB 12/2/14
Quality Manager/Date

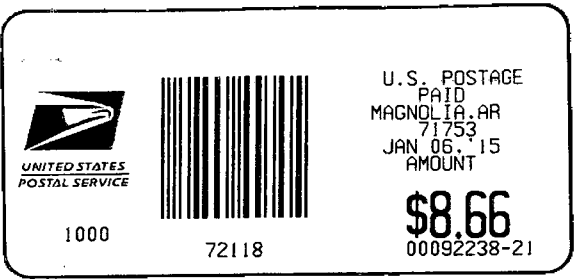
Report Checked by: EGB 12/29/14
Quality Manager/Date

I certify that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. The information contained in this document, to the best of my knowledge, is true, accurate and complete.

Curtis L. Briggs, BS 12/29/14
Quality Manager Date

No part of this work may be altered in any form or by any means without written permission from Bio-Analytical Laboratories.

City of Magnolia-Big Creek WWTP
P.O. Box 666
Magnolia, AR 71754-0666
NPDES Permit# ARO043613
AFIN# 14-00859



NPDES Enforcement Section
Water Division
ADEQ
5301 N. Shore Dr.
North Little Rock, Arkansas 72118-5317

RETURN RECEIPT
REQUESTED

