Bio-Aquatic Testing, Inc.

TCEQ TNI Accredited

City of Cumming
WPCP
OUTFALL 001

Chronic Biomonitoring Report

62453

Ceriodaphnia dubia
Pimephales promelas

June 14, 2016

Approved by: Joshua Reed

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

TABLE OF CONTENTS

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

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

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TOXICITY TEST REPORT - Chronic

Client:	Cumming, City of	Sample:	001
Facility:	WPCP	Laboratory Number:	62453
Permit No.	GA0046019	Date:	June 14, 2016

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

SAMPLE COLLECTION:

Composite effluent samples from the City of Cumming, WPCP, were received on June 14, 2016, June 16, 2016, and June 20, 2016. Effluent samples were collected from Outfall 001 by facility personnel. Sample three was received and used out of hold time.

The effluent samples were analyzed for total residual chlorine using the Hanna Ion Specific Meter #711 and contained <0.10 mg/L, <0.10 mg/L, and <0.10 mg/L, respectively. Effluent and laboratory dilution water pH, temperature, and dissolved oxygen data were collected daily.

TEST PROCEDURES:
Ceriodaphnia dubia

EPA METHOD: 1002

The seven-day (three brood) Chronic *Ceriodaphnia dubia* survival and reproduction test was initiated at 16:49 hours on June 14, 2016. Five effluent concentrations of 6%, 12%, 24%, 48% and 95% were prepared using synthetic water as dilution water. The test was set up with 30mL plastic cups containing 15mL of test solution or control dilution water. Each effluent concentration or control dilution water included ten replicate cups with one organism in each cup. The control was conducted concurrently with the test. Test organisms were less than 24-hour old laboratory cultured neonates. Neonates were introduced into the test solutions using a blocking design. The test was renewed daily with newly prepared solutions. Food consisting of a half-milliliter suspension of the green algae, *Selenastrum capricornutum,* and YTC was added to the test solutions each day. The test proceeded for seven days or until 60% of the females in the control had three broods. Data on survival and number of young produced per female were collected daily. The test ended at 11:49 hours on June 22, 2016. Survival and reproduction data were statistically (p=0.05) analyzed according to EPA procedures to determine the Lowest Observable Effect Concentration (LOEC) and the No Observable Effect Concentration (NOEC).

SURVIVAL:
Ceriodaphnia dubia

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

LOEC: Not Calculable (Q)
NOEC: 95% Effluent

REPRODUCTION:
Ceriodaphnia dubia

The *Ceriodaphnia dubia* reproduction data were normally distributed at the alpha level of 0.01 (13.277) using the Chi-square test for normality. Reproduction data were shown to be homogeneous using Bartlett's test at the alpha level of 0.01 (15.09) without data transformations. Using ANOVA and Dunnett's Test, *Ceriodaphnia dubia* reproduction data demonstrated no statistically significant differences between the control and any of the effluent concentrations tested.

LOEC: Not Calculable (Q)
NOEC: 95% Effluent

TEST PROCEDURES:
Pimephales promelas

EPA METHOD: 1000
The seven-day Chronic *Pimephales promelas* survival and growth test was initiated at 17:30 hours on June 14, 2016. Five effluent concentrations of 6%, 12%, 24%, 48% and 95% were prepared using synthetic water as dilution water. The test was set up with 450mL plastic cups containing 250mL of test solution as test chambers. Each concentration consisted of five replicate chambers containing eight organisms each, giving a total of 40 (forty) per treatment. The control test was conducted concurrently with the test. Test organisms were laboratory-cultured *Pimephales promelas* larvae less than 24-hours old. The number of surviving larvae and water quality parameters in the old test solutions were recorded after each 24-hour period. The test was renewed daily with fresh solutions. Surviving larvae in each test chamber were fed freshly hatched brine shrimp two times per day. The test proceeded for seven days.

At the end of the test, all organisms were sacrificed, dried, and weighed. Data on surviving organisms and water quality were collected. The test ended at 11:04 hours on June 21, 2016. Survival and growth (weight) were statistically (p=0.05) analyzed according to EPA procedures to determine the Lowest Observable Effect Concentration (LOEC) and the No Observable Effect Concentration (NOEC).

SURVIVAL:
Pimephales promelas

ANOVA and Dunnett's test performed on *Pimephales promelas* survival data demonstrated no statistically significant differences between the control and any of the effluent concentrations tested.

LOEC: Not Calculable (Q)
NOEC: 95% Effluent

GROWTH:
Pimephales promelas

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

LOEC: Not Calculable (Q)
NOEC: 95% Effluent

BIO-AQUATIC TESTING, INC.
TOXICITY TEST

Chronic *Ceriodaphnia dubia*

Client: Cumming, City of WPCP

Permit Number: NPDES GA0046019

Sample Type: Composite

Outfall Name: 001

Receiving Water Name:

Lab ID: 62453

Test Temperature (oC): 25 ± 1

Photo Period: 16 hours light, 8 hours dark

Dilution Water: synthetic

Begin Date: 6/14/2016

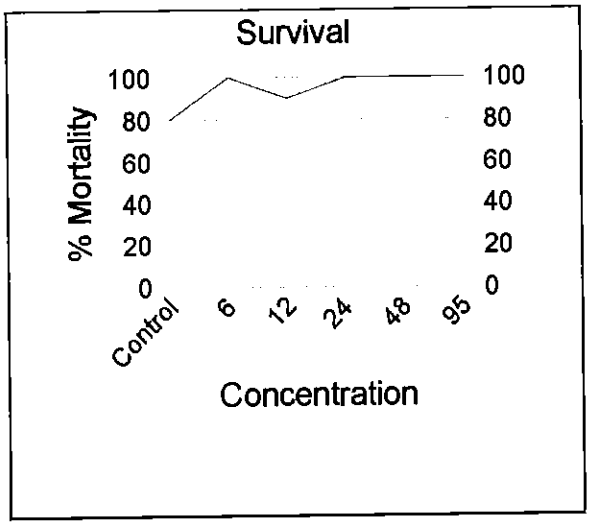
End Date: 6/22/2016

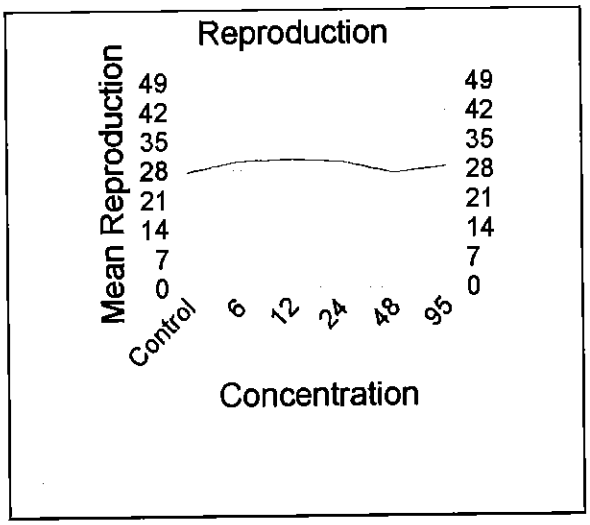
Test Start Time: 16:49 **Test End Time:** 11:49

SURVIVAL AND REPRODUCTION TABLE

FEMALE #	Control	6 %	12 %	24 %	48 %	95 %
1	29	26	29	43	29	32
2	D- 14	28	28	27	27	28
3	D- 19	33	34	29	23	22
4	24	31	31	27	24	25
5	26	31	29	32	23	25
6	34	30	D- 9	24	28	27
7	28	30	30	28	37	22
8	27	28	35	31	28	30
9	26	32	31	29	28	39
10	26	32	28	30	25	38
Mean	27.5	30.1	30.5	30	27.2	28.8
C.V%	10.9	7.2	8.2	16.9	15	20.8
Var	9.142	4.766	6.277	26	16.844	36.177
Std.Dev.	3.023	2.183	2.505	5.099	4.104	6.014
Max	34	33	35	43	37	39
Min	24	26	28	24	23	22

Concentration Response Relationships





BIO-AQUATIC TESTING, INC.

Survival and Reproduction

Control

Date	1	2	3	4	5	6	7	8	9	10
6/15	A	A	A	A	A	A	A	A	A	A
6/16	A	A	A	A	A	A	A	A	A	A
6/17	A	3	A	3	3	A	4	A	3	3
6/18	A	A	4	A	A	8	A	A	A	A
6/19	3	D11	9	8	9	11	10	11	9	10
6/20	11	D	D6	13	14	15	14	16	14	13
	14	14	19	24	26	34	28	27	26	26
6/21	A	D	D	A	A	A	A	A	A	A
	14	14	19	24	26	34	28	27	26	26
6/22	15	D	D	A	A	A	A	A	A	A
	29	14	19	24	26	34	28	27	26	26

Mean: 27.50 **CV%** 10.90
Var. 9.14 **Max** 34
Std.Dev. 3.02 **Min** 24

6

Date	1	2	3	4	5	6	7	8	9	10
6/15	A	A	A	A	A	A	A	A	A	A
6/16	A	A	A	A	A	A	A	A	A	A
6/17	3	3	A	4	3	A	4	A	5	5
6/18	A	A	9	A	A	6	A	3	A	A
6/19	10	11	10	12	12	10	11	10	11	12
6/20	13	14	14	15	16	14	15	15	16	15
	26	28	33	31	31	30	30	28	32	32
6/21	A	A	A	A	A	A	A	A	A	A
	26	28	33	31	31	30	30	28	32	32
6/22	A	A	A	A	A	A	A	A	A	A
	26	28	33	31	31	30	30	28	32	32

Mean: 30.10 **CV%** 7.20
Var. 4.77 **Max** 33
Std.Dev. 2.18 **Min** 26

12

Date	1	2	3	4	5	6	7	8	9	10
6/15	A	A	A	A	A	A	A	A	A	A
6/16	A	A	A	A	A	A	A	A	A	A
6/17	4	3	A	5	3	A	A	A	3	3
6/18	A	A	8	A	A	9	4	7	A	A
6/19	11	10	12	11	10	D	11	13	13	10
6/20	14	15	14	15	16	D	15	15	15	15
	29	28	34	31	29	9	30	35	31	28
6/21	A	A	A	A	A	D	A	A	A	A
	29	28	34	31	29	9	30	35	31	28
6/22	A	A	A	A	A	D	A	A	A	A
	29	28	34	31	29	9	30	35	31	28

Mean: 30.50 **CV%** 8.20
Var. 6.28 **Max** 35
Std.Dev. 2.51 **Min** 28

24

Date	1	2	3	4	5	6	7	8	9	10
6/15	A	A	A	A	A	A	A	A	A	A
6/16	A	A	A	A	A	A	A	A	A	A
6/17	A	A	A	A	A	A	3	A	A	3
6/18	A	A	4	A	6	A	A	4	3	A
6/19	11	10	11	12	11	10	11	12	11	12
6/20	14	17	14	15	15	14	14	15	15	15
	25	27	29	27	32	24	28	31	29	30
6/21	18	A	A	A	A	A	A	A	A	A
	43	27	29	27	32	24	28	31	29	30
6/22	A	A	A	A	A	A	A	A	A	A
	43	27	29	27	32	24	28	31	29	30

Mean: 30.00 **CV%** 16.90
Var. 26.00 **Max** 43
Std.Dev. 5.10 **Min** 24

48

Date	1	2	3	4	5	6	7	8	9	10
6/15	A	A	A	A	A	A	A	A	A	A
6/16	A	A	A	A	A	A	A	A	A	A
6/17	3	3	A	3	A	A	A	3	4	3
6/18	A	A	3	A	4	4	A	A	A	A
6/19	A	8	9	8	7	11	9	10	11	9
6/20	11	A	A	13	12	13	14	15	13	13
	14	11	12	24	23	28	23	28	28	25
6/21	A	A	A	A	A	A	A	A	A	A
	14	11	12	24	23	28	23	28	28	25
6/22	15	16	11	A	A	A	14	A	A	A
	29	27	23	24	23	28	37	28	28	25

Mean: 27.20 **CV%** 15.00
Var. 16.84 **Max** 37
Std.Dev. 4.10 **Min** 23

95

Date	1	2	3	4	5	6	7	8	9	10
6/15	A	A	A	A	A	A	A	A	A	A
6/16	A	A	A	A	A	A	A	A	A	A
6/17	3	A	A	A	3	A	4	A	A	A
6/18	A	A	4	A	A	5	A	A	A	A
6/19	11	6	7	9	10	9	7	A	9	10
6/20	A	A	11	13	12	13	11	13	11	14
	14	6	22	22	25	27	22	13	20	24
6/21	18	A	A	A	A	A	A	A	A	A
	32	6	22	22	25	27	22	13	20	24
6/22	A	22	A	3	A	A	A	17	19	14
	32	28	22	25	25	27	22	30	39	38

Mean: 28.80 **CV%** 20.80
Var. 36.18 **Max** 39
Std.Dev. 6.01 **Min** 22

BIO-AQUATIC TESTING, INC.

Chronic CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION

Client: **Cumming, City of - WPCP** Lab ID: **62453** Culture No.: B2064016A

TEST INSTRUCTIONS:

ORGANISMS ADDED: Date: 6-14-16 Time: 1649 Technician: [illegible]

Photo Period 16hr Light/8hr dark

RANDOMIZATION:

SC-10	11

Dilution: Control

	DATE/TIME/ TECHNICIAN	1	2	3	4	5	6	7	8	9	10
24Hr	6-15-16 BH 1305	A	—	—	—	—	—	—	—	—	A
48Hr	6-16-16 BH 1150	A	—	—	—	—	—	—	—	—	A
72Hr	6-17-16 BH 1310	A	3	A	3	3	A	4	A	3	3
96Hr	6-18-16 BH 1111	A	A	4	A	A	8	A	—	—	A
5 days	6-19-16 J 1115	3	D 11	9	8	9	11	10	11	9	10
6 days	6-20-16 J 1205	11	/	D 6	13	14	15	14	15	14	13
7 days	6-21-16 BH 1214	A	/	/	A	—	—	—	/	—	A
8 days	6-22-16 BH 1149	5	/	/	A	—	—	—	/	—	A

Dilution: 6 %

	1	2	3	4	5	6	7	8	9	10
24Hr	A	—	—	—	—	—	—	—	—	A
48Hr	A	—	—	—	—	—	—	—	—	A
72Hr	3	3	A	4	3	A	4	A	5	5
96Hr	A	A	9	A	A	6	A	3	A	A
5 days	10	11	10	12	11	10	11	10	11	12
6 days	13	14	14	15	16	14	15	15	16	15
7 days	A	—	—	—	—	—	—	—	—	A
8 days	A	—	—	—	—	—	—	—	—	A

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

Page 1

BIO-AQUATIC TESTING, INC.

Chronic CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION

Client: Cumming, City of - WPCP Lab ID: 62453 Culture No.:

TEST INSTRUCTIONS:

Dilution: 12 %

	1	2	3	4	5	6	7	8	9	10
24Hr	A	—	—	—	—	—	—	—		A
48Hr	A	—	—	—	—	—	—	—	—	A
72Hr	4	3	A	5	3	A	A	A	3	3
96Hr	A	A	8	A	A	9	4	7	A	A
5 days	11	10	12	11	10	0	11	13	12	10
6 days	14	15	14	15	16		15	15	15	15
7 days	A	—	—		A		A	—	—	A
8 days	A	—	—	—	A		A	—	—	A

Dilution: 24 %

	1	2	3	4	5	6	7	8	9	10
24Hr	A	—	—	—					—	A
48Hr	A	—	—	—	—	—	—	—	—	A
72Hr	A	—	—	—	—	A	3	A	A	3
96Hr	A	A	4	A	6	A	A	4	3	A
5 days	11	10	11	12	11	10	11	12	11	10
6 days	14	15	14	15	15	14	14	15	15	15
7 days	18	A	—	—	—	—	—	—	—	A
8 days	A	2/4	—	—	—	—	—	—	—	A

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

Page 2

BIO-AQUATIC TESTING, INC.

Chronic CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION

Client: Cumming, City of - WPCP Lab ID: 62453 Culture No.:

TEST INSTRUCTIONS:

Dilution: 48 %

	1	2	3	4	5	6	7	8	9	10
24Hr	A	—	—			—	—			A
48Hr	A	—	—	—	—	—	—	—	—	A
72Hr	3	3	A	3	A	A	A	3	4	3
96Hr	A	A	3	A	4	4	A	—	—	A
5 days	4	8	4	8	7	11	9	10	11	9
6 days	7	A	A	13	12	13	14	15	13	13
7 days	3	A	4	—	—	—	—	—	—	A
8 days	12	16	16	A	—	A	14	A	—	A

Dilution: 95 %

	1	2	3	4	5	6	7	8	9	10
24Hr	A	—	—							A
48Hr	A	—	—	—	—	—	—	—	—	A
72Hr	3	A	A	A	3	A	4	A	—	A
96Hr	A	A	4	A	A	5	A	—	—	A
5 days	11	6	7	9	10	9	7	A	9	10
6 days	A	A	11	13	12	13	12	13	11	14
7 days	18	A	—	—	—	—	—	—	—	A
8 days	A	22	A	3	A	—	A	17	19	14

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

BIO-AQUATIC TESTING, INC.

Chronic CERIODAPHNIA DUBIA SURVIVAL AND REPRODUCTION

Client: **Cumming, City of - WPCP** Lab ID: **62453** Culture No.: _____

TEST INSTRUCTIONS:

Test Temperatures

	0Hr	24Hr		48Hr		72Hr		96Hr		5 days		6 days		7 days
	new	old / new		old / new		old / new		old / new		old / new		old / new		old
Control	25.4 / –	25.2	25.0	24.3	24.8	24.1	24.9	24.8	24.6	24.4 / –	24.1 / –	24.1 / –	24.0 / –	24.8
6	/ –				24.7									
12	/ –													
24	/ –													
48	25.1 / –													
95	/ –													
TIME/DATE TECH	6-17-16 OH 1649	6-15-16 BH	1130	6-16-16 BH	1200	6-17-16 1310	MD	6-18-16 BH	1117	6-19-16 2	1115	6-20-16 2	1105	6-21-16 BH 1215
IR GUN ID #	011	005		011		011		005		005		005		011
SAMPLE # @ RENEWAL	1	1		1		2		2		2		3		

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

BIO-AQUATIC TESTING, INC. TOXICITY TEST

Chronic *Pimephales promelas*

Client: Cumming, City of WPCP
Permit Number: NPDES GA0046019
Outfall Name: 001
Sample Type: Composite
Receiving Water Name:

Lab ID: 62453
Test Temperature (oC): 25 ± 1
Photo Period: 16 Hours Light 8 Hours Dark

Test Start Time: 17:30 Test End Time: 11:04

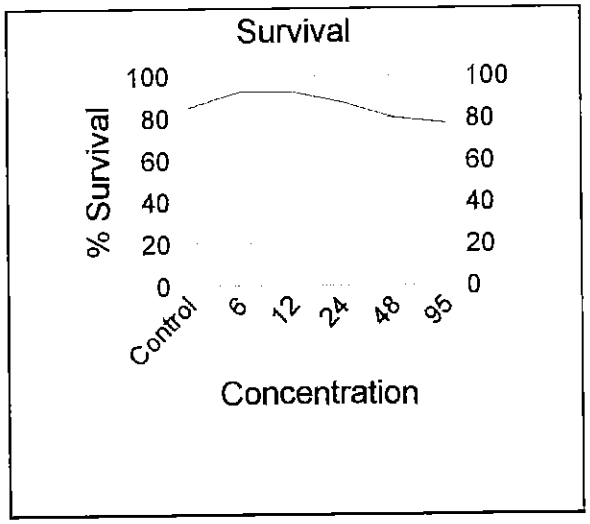
Begin Date: 6/14/2016
End Date: 6/21/2016

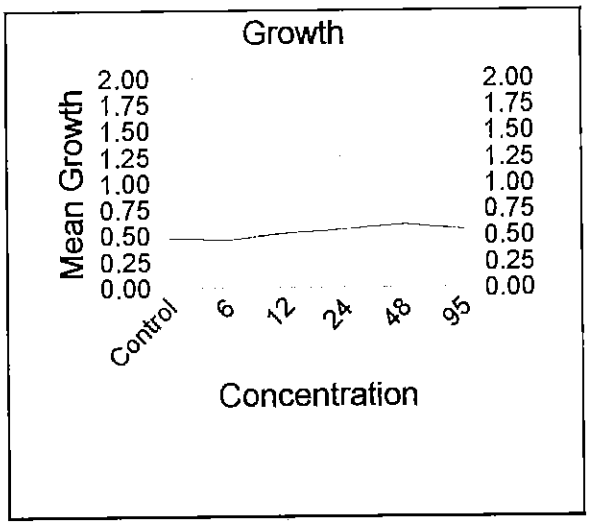
SURVIVAL

Effluent Concentration		Number Of Alive 6/14	6/15	6/16	6/17	6/18	6/19	6/20	6/21	Avg% Surv.
Control	A	8	8	8	8	8	7	7	7	85.0%
	B	8	8	8	8	8	7	7	7	
	C	8	8	8	8	8	8	8	8	
	D	8	8	8	8	8	5	5	5	
	E	8	8	7	7	7	7	7	7	
6	A	8	8	8	8	8	8	8	8	92.5%
	B	8	8	8	8	8	8	8	8	
	C	8	8	8	8	8	7	7	7	
	D	8	8	8	8	8	7	7	7	
	E	8	8	8	8	8	8	8	7	
12	A	8	8	8	8	8	8	8	8	92.5%
	B	8	8	8	8	8	6	6	6	
	C	8	8	8	8	8	8	8	8	
	D	8	8	8	8	8	8	8	8	
	E	8	8	8	8	8	7	7	7	
24	A	8	8	7	7	7	7	7	6	87.5%
	B	8	8	8	8	8	8	8	8	
	C	8	8	8	8	8	8	8	8	
	D	8	8	8	8	8	6	6	6	
	E	8	8	8	8	8	7	7	7	

Effluent Concentration		Number Of Alive 6/14	6/15	6/16	6/17	6/18	6/19	6/20	6/21	Avg% Surv.
48	A	8	8	8	8	8	7	7	7	80.0%
	B	8	8	7	7	7	7	7	7	
	C	8	8	8	8	8	6	6	6	
	D	8	8	8	8	8	7	6	6	
	E	8	8	8	8	8	7	7	6	
95	A	8	8	8	8	8	8	8	8	77.5%
	B	8	8	8	8	8	6	6	6	
	C	8	8	8	7	7	6	6	6	
	D	8	8	8	8	8	5	5	5	
	E	8	8	8	8	8	6	6	6	
	A									
	B									
	C									
	D									
	E									

Concentration Response Relationships





BIO-AQUATIC TESTING, INC.

Chronic Pimephales promelas SURVIVAL Lab ID: **62453**

Client: **Cumming, City of** Facility **WPCP** Outfall:001 Sample Type Composite

TEST INSTRUCTIONS:

Culture No. : P1-16-165A Photo Period: 16hr light, 8hr dark **RANDOMIZATION:** SC-5 0

Dilution:	Control					6					12					24				
DATE/TIME/ TECHNICIAN	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
0Hr 6-14-16 DB 1730	8	—	—	—	—	8	—	—	—	—	8	—	—	—	—	8	—	—	—	—
24Hr 6-15-16 SE 1120	8	—	—	—	—	8	—	—	—	—	8	—	—	—	—	8	—	—	—	—
48Hr 6-16-16 SE 950	8	—	—	—	7	8	—	—	—	—	8	—	—	—	—	7	8	—	—	—
72Hr 6-17-16 MM 10 44	8	—	—	—	7	8	—	—	—	—	8	—	—	—	—	7	8	—	—	—
96Hr 6-18-16 DB 0920	8	—	—	—	7	8	—	—	—	—	8	—	—	—	—	7	8	—	—	—
5 days 6-19-16 DB 1315	7	7	8	5	7	8	8	7	7	8	8	6	8	8	7	7	8	8	6	7
6 days 6-20-16 DB 1025	7	7	8	5	7	8	8	7	7	8	8	6	8	8	7	7	8	8	6	7
7 days 6-21-16 DB 1114	7	7	8	5	7	8	8	7	7	7	8	6	8	6	7	6	8	8	6	7

Dilution:	48					95														
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
0Hr	8	—	—	—	—	8	—	—	—	—										
24Hr	8	—	—	—	—	8	—	—	—	—										
48Hr	8	7	8	—	—	8	—	—	—	—										
72Hr	8	7	8	—	—	8	8	7	8	8										
96Hr	8	7	8	—	—	8	8	7	8	8										
5 days	7	7	6	7	7	6	6	6	5	6										
6 days	7	7	6	6	7	8	6	6	5	6										
7 days	7	7	6	6	6	8	6	6	5	6										

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

BIO-AQUATIC TESTING, INC.

Chronic Pimephales promelas SURVIVAL Lab ID: **62453**

Client: **Cumming, City of** Facility **WPCP** Outfall:001 Sample Type Composite

TEST INSTRUCTIONS:

Test Temperatures

	0Hr	24Hr		48Hr		72Hr		96Hr		5 days		6 days		7 days
	new	old	new	old	new	old	new	old	new	old	new	old	new	old
Control	25.3	25.2	25.3	25.2	25.2	25	25.1	25.9	25.9	25.4	25.4	25.1	25.2	25.9
6														
12														
24														
48														
95														
TIME/DATE TECH	6-14-16 1030 AP	6-15-16 8a 1120		6-16-16 SL 9a		6-17-16 mm 1055		6-18-16 AP 0720		6-19-16 AP 1315		6-20-16 1030 AP		6-21-16 JB 1100
IR GUN ID #	013	013		013		013		013		013		013		013
SAMPLE # @ RENEWAL	1	1		1		2		2		2 3		3		

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

2nd Organism

BIO-AQUATIC TESTING, INC.

TOXICITY TEST

Chronic *Pimephales promelas*

Client: Cumming, City of WPCP

Lab ID: 62453

Permit Number: GA0046019

Sample Type: Composite **Outfall Name:** 001

Receiving Water Name:

Synthetic

	ON	SN	Wt.	Avg.	SN Avg.
A	8	7	3.244	0.406	0.463
B	8	7	4.153	0.519	0.593
C	8	8	4.106	0.513	0.513
D	8	5	3.150	0.394	0.630
E	8	7	4.154	0.519	0.593

Mean	C.V. %
0.470	13.7

SN Mean	SN C.V. %
0.559	12.2

6

	ON	Wt.	Avg.
A	8	4.113	0.514
B	8	3.915	0.489
C	8	3.345	0.418
D	8	3.473	0.434
E	8	3.400	0.425

Mean	C.V. %
0.456	9.4

12

	ON	Wt.	Avg.
A	8	4.751	0.594
B	8	2.959	0.370
C	8	4.608	0.576
D	8	4.076	0.510
E	8	4.399	0.550

Mean	C.V. %
0.520	17.2

24

	ON	Wt.	Avg.
A	8	3.627	0.453
B	8	4.866	0.608
C	8	4.685	0.586
D	8	3.990	0.499
E	8	5.070	0.634

Mean	C.V. %
0.556	13.8

48

	ON	Wt.	Avg.
A	8	4.675	0.584
B	8	4.334	0.542
C	8	4.390	0.549
D	8	4.553	0.569
E	8	6.120	0.765

Mean	C.V. %
0.602	15.4

95

	ON	Wt.	Avg.
A	8	6.131	0.766
B	8	3.481	0.435
C	8	3.651	0.456
D	8	4.465	0.558
E	8	4.293	0.537

Mean	C.V. %
0.551	23.9

	ON	Wt.	Avg.
A			
B			
C			
D			
E			

Mean	C.V. %

	ON	Wt.	Avg.
A			
B			
C			
D			
E			

Mean	C.V. %

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

BIO-AQUATIC TESTING, INC.

Chronic — Pimephales promelas — TOXICITY TEST

Client: Cumming, City of - WPCP

Lab ID: **62453**

Begin Date: 6/14/2016 End Date: 6/21/2016 Organism: Pimephales promelas Balance: Sartorius MP3

Analyst: MM

Weigh Date: 6-23-16

Date/Time placed in Oven: 6-21-16 1535

Date/Time removed from Oven: 1535

Control

	Qty.	Wt.
A	7	3.244
B	7	4.153
C	8	4.106
D	5	3.150
E	7	4.154

6 %

	Qty.	Wt.
A	8	5m 4.113
B	8	3.915
C	7	3.345
D	1	3.473
E		3.400

12 %

	Qty.	Wt.
A	8	4.751
B	6	2.957 4.608
C	8	4.076
D	8	4.399
E	7	

24 %

	Qty.	Wt.
A	6	3.623
B	8	4.866
C	8	4.685
D	6	3.990
E	7	5.070

48 %

	Qty.	Wt.
A	7	4.673
B	7	4.334
C	6	4.390
D	1	4.553
E	1	6.120

95 %

	Qty.	Wt.
A	8	4.131
B	6	6m 3.481
C	6	3.651
D	5	4.465
E	6	~~4.2~~ m 4.943

	Qty.	Wt.
A		
B		
C		
D		
E		

	Qty.	Wt.
A		
B		
C		
D		
E		

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

APPENDIX A

STATISTICS SUMMARY

Both the lethal and sub-lethal endpoints were statistically calculated according to their respective EPA guidelines. The Chronic Freshwater organisms were calculated according to EPA-821-R-02-013, October 2002 Fourth Edition. The Chronic Marine and Estuarine organisms were calculated according to EPA-821-R-02-014, October 2002 Third Edition. The Acute Freshwater and Marine organisms were calculated according to EPA-821-R-02-012, October 2002 Fifth Edition. The fertilization organisms were calculated according to EPA-600-R-95-136 or EPA-600-R-12-022, dependent upon the species. Listed below are the basic principles of these guidelines. If you would like a copy of the raw statistical calculations for your test then please contact us.

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

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

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

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

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

The fertilization data is analyzed using Shapiro Wilks Test and Bartlett's Test. If the data passes both tests then the data is run through ANOVA and Dunnetts. If the data fails Shapiro Wilks Test or Bartlett's Test then Steels Many One Test is used. Point estimation may or TST methodology may also be used.

chronic cerio repro
File: 62453.cdr Transform: NO TRANSFORMATION

Chi-square test for normality: actual and expected frequencies

INTERVAL	<-1.5	-1.5 to <-0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
EXPECTED	4.020	14.520	22.920	14.520	4.020
OBSERVED	3	14	31	7	5

Calculated Chi-Square goodness of fit test statistic = 7.2594
Table Chi-Square value (alpha = 0.01) = 13.277

Data PASS normality test. Continue analysis.

chronic cerio repro
File: 62453.cdr Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 11.47

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.

chronic cerio repro
File: 62453.cdr Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	166.000	33.200	1.201
Within (Error)	54	1492.600	27.641	
Total	59	1658.600		

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

chronic cerio repro
File: 62453.cdr Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	con	25.300	25.300		

2	6	30.100	30.100	-2.042
3	12	28.400	28.400	-1.318
4	24	30.000	30.000	-1.999
5	48	27.200	27.200	-0.808
6	95	28.800	28.800	-1.489

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

chronic cerio repro
File: 62453.cdr Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	con	10			
2	6	10	5.431	21.5	-4.800
3	12	10	5.431	21.5	-3.100
4	24	10	5.431	21.5	-4.700
5	48	10	5.431	21.5	-1.900
6	95	10	5.431	21.5	-3.500

chronic fathead survival
File: 62453.pps Transform: NO TRANSFORMATION

Shapiro - Wilk's test for normality

D = 19.200

W = 0.971

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

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

chronic fathead survival
File: 62453.pps Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 3.38

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

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

chronic fathead survival
File: 62453.pps Transform: NO TRANSFORMATION

62453

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	6.267	1.253	1.567
Within (Error)	24	19.200	0.800	
Total	29	25.467		

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

chronic fathead survival
File: 62453.pps Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	con	6.800	6.800		
2	6	7.400	7.400	-1.061	
3	12	7.400	7.400	-1.061	
4	24	7.000	7.000	-0.354	
5	48	6.400	6.400	0.707	
6	95	6.200	6.200	1.061	

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

chronic fathead survival
File: 62453.pps Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	con	5			
2	6	5	1.335	19.6	-0.600
3	12	5	1.335	19.6	-0.600
4	24	5	1.335	19.6	-0.200
5	48	5	1.335	19.6	0.400
6	95	5	1.335	19.6	0.600

chronic fathead growth
File: 62453.ppg Transform: NO TRANSFORMATION

Shapiro - Wilk's test for normality

D = 0.183

W = 0.965

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.

chronic fathead growth
File: 62453.ppg Transform: NO TRANSFORMATION

Bartlett's test for homogeneity of variance
Calculated B1 statistic = 4.75

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.

chronic fathead growth
File: 62453.ppg Transform: NO TRANSFORMATION

ANOVA TABLE

SOURCE	DF	SS	MS	F
Between	5	0.076	0.015	2.007
Within (Error)	24	0.183	0.008	
Total	29	0.259		

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

chronic fathead growth
File: 62453.ppg Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	TRANSFORMED MEAN	MEAN CALCULATED IN ORIGINAL UNITS	T STAT	SIG
1	con	0.470	0.470		
2	6	0.456	0.456	0.257	
3	12	0.520	0.520	-0.902	
4	24	0.556	0.556	-1.554	
5	48	0.602	0.602	-2.384	
6	95	0.550	0.550	-1.453	

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

chronic fathead growth
File: 62453.ppg Transform: NO TRANSFORMATION

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

GROUP	IDENTIFICATION	NUM OF REPS	Minimum Sig Diff (IN ORIG. UNITS)	% of CONTROL	DIFFERENCE FROM CONTROL
1	con	5			
2	6	5	0.130	27.7	0.014
3	12	5	0.130	27.7	-0.050
4	24	5	0.130	27.7	-0.086
5	48	5	0.130	27.7	-0.132
6	95	5	0.130	27.7	-0.080

Bio-Aquatic Testing, Inc.

FRESH WATER TEST SETUP FORM

Client: Cumming, City of

Permit GA0046019

Facility: WPCP

Lab Number 62453

Outfall Name: 001

Number of samples 3

Dilution Water: Synthetic Lab

Receiving Water Name:

Dechlorinate Sample: No

Sx #	Rcvd Date	Rcvd Time	Sampling Dates Begin Date	Sampling Dates End Date	Sampling Times Start	Sampling Times End
1	06/14/16	11:20	06/12/16	06/13/16	09:30	09:30
2	06/16/16	16:30	06/14/16	06/15/16	09:30	09:30
3	06/20/16	10:30	06/16/16	06/17/16	09:30	09:30

Type of Test(s)

Ceriodaphnia dubia Chronic

Pimephales promelas Chronic

Start Sx # 1 Date: 6/14/2016

Renew Sx # 1 Date: 6/15/2016

Renew Sx # 1 Date: 6/16/2016

Renew Sx # 2 Date: 6/17/2016

Renew Sx # 2 Date: 6/18/2016

Renew Sx # 2 Date: 6/19/2016

Renew Sx # 3 Date: 6/20/2016

Controls: Synthetic

pH Match:

Hardness Match:

Test Start Date: 6/14/2016

Test End Date: 6/21/2016

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

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

Concentrations: 6 12 24 48 95 % LF % 95

Test Chemistry on these dilutions: 6 12 24 48 95

Samples received by:

- ○ Greyhound
- ○ UPS Next Day
- ○ Delta Dash
- ○ Delta
- ○ Pony Express
- ○ Client Delivered
- ○ Southwest Airlines
- ○ DHL
- ● Federal Express
- ○ American Airlines
- ○ Bio Pick Up

Other:

BIO-AQUATIC TESTING, INC.

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

Client: Cumming, City of **Lab ID:** 62453

Facility: WPCP **Outfall:** 001

Dilution Water(s): Synthetic Lab **Test Date:** June 14, 2016

** 100 %

Effluent Sample #	Received Date	Received Time	** Residual Cl_2	DeChlor (ml/L)	** Ammonia mg/L	Analyst Initials	Initial Salinity	Adjusted Salinity	Temp. Received
1	6/14/16	11:20	<0.10	N/A	<0.25	JR	N/A	N/A	3.9
2	6/16/16	16:30	<0.10	N/A	<0.25	LZ	N/A	N/A	4.1
3	6/20/16	10:30	<0.10	N/A	<0.25	DF	N/A	N/A	2.9

Chlorine Analysis Method: Hanna Ion Specific Meter #711 **Dechlorination Reagent:** 0.025 N Sodium Thiosulfate

Sample #	Received Date	Received Time	Hardness (EDTA) As mg/L $CaCO_3$ CON	Hardness (EDTA) As mg/L $CaCO_3$ 100	ALKALINITY TO END POINT pH 4.50 =/- 0.05 as mg/L $CaCO_3$ CON	ALKALINITY TO END POINT pH 4.50 =/- 0.05 as mg/L $CaCO_3$ 100	Analyst Initials
1	6/14/16	11:20	144.0	116.0	61.0	89.0	JAS
2	6/16/16	16:30	144.0	112.0	61.0	92.0	JAS
3	6/20/16	10:30	138.0	112.0	56.0	91.0	JAS

Date		Sample #	Values are at Highest Dilution: Specific Conductivity as umhos/cm	Values are at Highest Dilution: Salinity (ppt)	Values are at 100% Dilution: Residual Chlorine as mg Cl_2/L	Values are at 100% Dilution: 1 ml 0.02N $Na_2S_2O_3$/L	Analyst	Other
6/14	Lab H2O		474	0.3			GC	
6/15	Lab H2O		464	0.3			GC	
6/16	Lab H2O		461	0.3			GC	
6/17	Lab H2O		469	0.3			GC	
6/18	Lab H2O		439	0.3			GC	
6/19	Lab H2O		429	0.2			MM	
6/20	Lab H2O		430	0.2			GC	
6/14	OUTFALL*	1	536	0.3	<0.10	N/A	GC	
6/15	OUTFALL*	1	553	0.3	<0.10	N/A	GC	
6/16	OUTFALL*	1	552	0.3	<0.10	N/A	GC	
6/17	OUTFALL*	2	559	0.3	<0.10	N/A	GC	
6/18	OUTFALL*	2	549	0.3	<0.10	N/A	GC	
6/19	OUTFALL*	2	546	0.3	<0.10	N/A	MM	
6/20	OUTFALL*	3	588	0.3	<0.10	N/A	GC	

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

BIO-AQUATIC TESTING, INC.

pH, Dissolved Oxygen

Chronic **Ceriodaphnia dubia**

Client: Cumming, City of **Lab ID:** 62453

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

Outfall: 001 **Test Begin Date:** June 14, 2016

NR indicates that the test is non-renewal.

					Concentration							
ANALYST	DATE	TIME	SX#	UNIT	Control	6	12	24	48	95		
GC	6/14	Start	1	pH	7.9	7.9	7.7	7.7	7.7	7.6		
		25 ± 1		DO (mg/L)	8.4	7.8	7.8	7.8	7.8	7.8		
GC	6/15	24 Hr	1	pH	8.1	8.0	8.0	8.0	8.0	8.0		
		25 ± 1		DO (mg/L)	8.2	8.1	8.0	8.0	8.0	8.0		
		Renew	1	pH	7.8	7.8	7.7	7.7	7.6	7.6		
				DO (mg/L)	7.9	7.9	8.0	8.0	8.2	8.2		
GC	6/16	48 Hr	1	pH	8.3	7.7	7.8	7.8	7.8	7.8		
		25 ± 1		DO (mg/L)	8.1	8.1	8.1	8.1	8.1	8.1		
		Renew	1	pH	7.8	7.8	7.7	7.7	7.6	7.6		
				DO (mg/L)	8.0	8.0	8.2	8.2	8.4	8.4		
GC	6/17	72 Hr	1	pH	8.3	7.6	7.6	7.6	7.7	7.7		
		25 ± 1		DO (mg/L)	8.2	8.0	8.0	8.0	7.9	7.9		
		Renew	2	pH	7.7	7.8	7.8	7.8	7.8	7.8		
				DO (mg/L)	7.7	7.8	7.9	7.9	8.0	8.0		
GC	6/18	96 Hr	2	pH	7.9	7.8	7.8	7.8	7.8	7.8		
		25 ± 1		DO (mg/L)	7.9	7.9	7.9	7.9	7.9	7.9		
		Renew	2	pH	7.8	7.8	7.8	7.8	7.8	7.8		
				DO (mg/L)	7.8	7.9	8.1	8.1	8.3	8.3		
MM	6/19	120 Hr	2	pH	7.7	7.6	7.6	7.6	7.7	7.7		
		25 ± 1		DO (mg/L)	7.8	7.8	7.8	7.8	7.9	7.9		
		Renew	2	pH	7.9	7.9	7.8	7.8	7.7	7.7		
				DO (mg/L)	8.1	8.0	8.2	8.3	8.4	8.5		
MM	6/20	144 Hr	2	pH	7.7	7.6	7.6	7.6	7.6	7.6		
		25 ± 1		DO (mg/L)	8.0	8.0	7.9	7.9	7.9	7.9		
		Renew	3	pH	7.8	7.8	7.8	7.8	7.8	7.8		
				DO (mg/L)	8.2	8.2	8.1	8.1	8.3	8.5		
GC	6/21	168 Hr	3	pH	7.9	7.8	7.7	7.7	7.8	7.8		
		25 ± 1		DO (mg/L)	7.7	7.7	7.7	7.7	7.6	7.6		

BIO-AQUATIC TESTING, INC.

pH, Dissolved Oxygen

Chronic **Pimephales promelas**

Client: Cumming, City of **Lab Number:** 62453

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

Outfall: 001 **Test Begin Date:** June 14, 2016

NR indicates that the test is non-renewal.

ANALYST	DATE	TIME	SX#	UNIT	Concentration							
					Control	6	12	24	48	95		
GC	6/14	Start	1	pH	7.9	7.9	7.7	7.7	7.7	7.6		
		25 ± 1		DO (mg/L)	8.4	7.8	7.8	7.8	7.8	7.8		
GC	6/15	24 Hr	1	pH	7.5	7.6	7.6	7.6	7.6	7.6		
		25 ± 1		DO (mg/L)	7.9	7.9	7.9	7.9	7.8	7.8		
		Renew	1	pH	7.8	7.8	7.7	7.7	7.6	7.6		
				DO (mg/L)	7.9	7.9	8.0	8.0	8.2	8.2		
GC	6/16	48 Hr	1	pH	7.5	7.5	7.5	7.5	7.5	7.5		
		25 ± 1		DO (mg/L)	8.2	8.0	7.9	7.9	7.7	7.7		
		Renew	1	pH	7.8	7.8	7.7	7.7	7.6	7.6		
				DO (mg/L)	8.0	8.0	8.2	8.2	8.4	8.4		
GC	6/17	72 Hr	1	pH	7.5	7.5	7.5	7.5	7.5	7.5		
		25 ± 1		DO (mg/L)	8.0	7.8	7.7	7.7	7.7	7.7		
		Renew	2	pH	7.7	7.8	7.8	7.8	7.8	7.8		
				DO (mg/L)	7.7	7.8	7.9	7.9	8.0	8.0		
GC	6/18	96 Hr	2	pH	7.6	7.6	7.5	7.5	7.5	7.5		
		25 ± 1		DO (mg/L)	7.9	7.8	7.7	7.7	7.5	7.5		
		Renew	2	pH	7.8	7.8	7.8	7.8	7.8	7.8		
				DO (mg/L)	7.8	7.9	8.1	8.1	8.3	8.3		
MM	6/19	120 Hr	2	pH	7.5	7.4	7.4	7.4	7.4	7.4		
		25 ± 1		DO (mg/L)	8.1	7.7	7.6	7.5	7.4	7.3		
		Renew	2	pH	7.9	7.9	7.8	7.8	7.7	7.7		
				DO (mg/L)	8.1	8.0	8.2	8.3	8.4	8.5		
MM	6/20	144 Hr	2	pH	7.5	7.5	7.5	7.5	7.5	7.5		
		25 ± 1		DO (mg/L)	8.0	7.8	7.8	7.8	7.7	7.6		
		Renew	3	pH	7.8	7.8	7.8	7.8	7.8	7.8		
				DO (mg/L)	8.2	8.2	8.1	8.1	8.3	8.5		
GC	6/21	168 Hr	3	pH	7.4	7.3	7.3	7.3	7.3	7.3		
		25 ± 1		DO (mg/L)	7.1	7.1	7.2	7.2	7.1	7.1		

Appendix B

Ceriodaphnia dubia

BIO-AQUATIC TESTING, INC.

Carrollton, TX

REFERENCE TOXICANTS

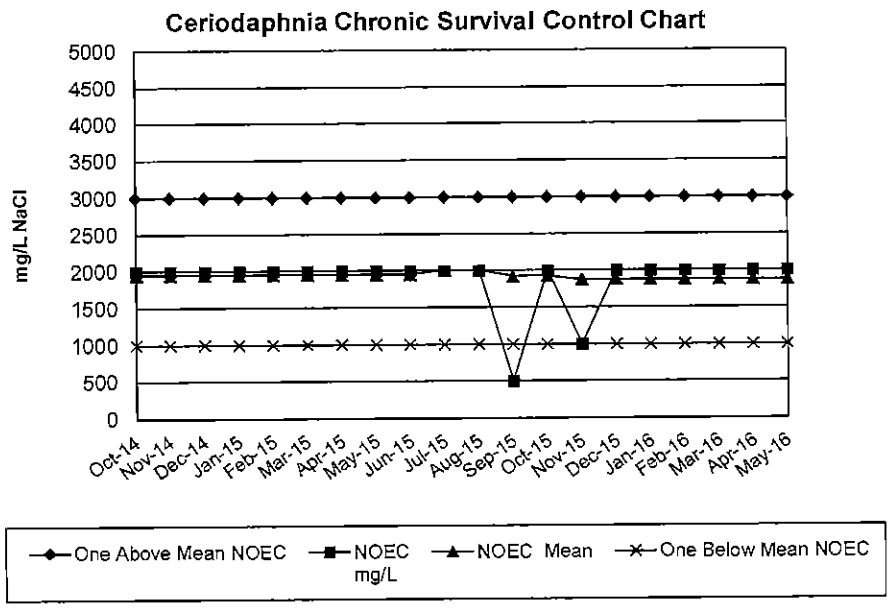
Bio-Aquatic Testing conducts reference toxicant testing monthly for organisms cultured in-house. For studies requiring purchased organisms, reference toxicant testing is performed simultaneously. Reference toxicant testing validates data and measures organism consistency. Only reagent grade chemicals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

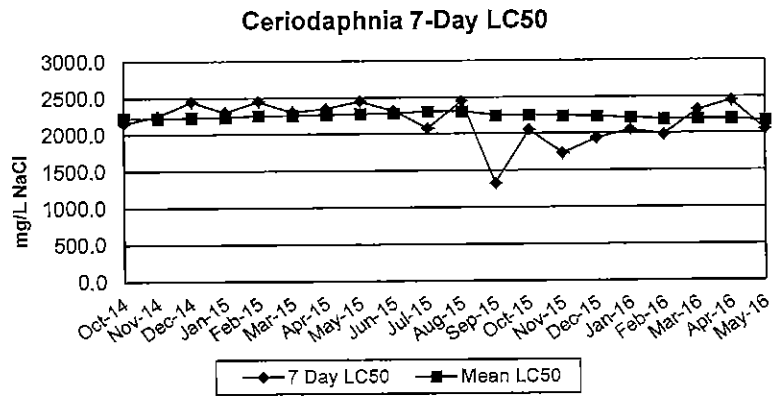
CHRONIC REFERENCE TOXICANT TEST RESULTS

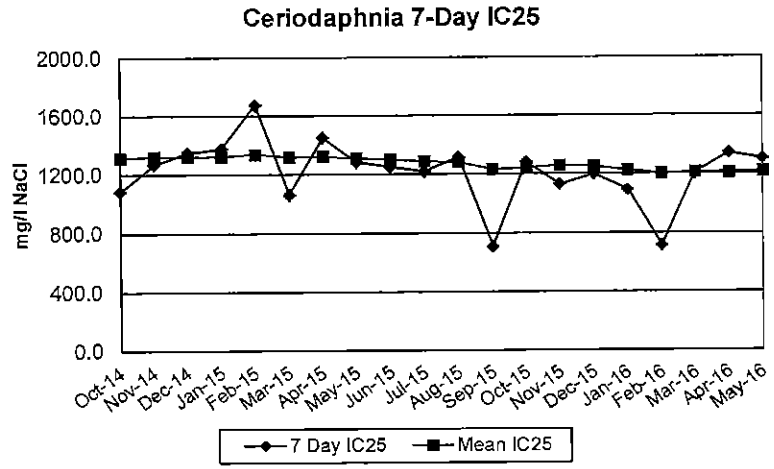
DILUTION WATER:	Standard Synthetic Freshwater						
CHEMICAL:	Sodium Chloride						
DURATION:	3-Brood Chronic						
TEST NUMBER:	255						
PROJECT NUMBER:	61884						
START DATE:	5/31/2016						
START TIME:	14:00						
TOTAL NUMBER EXPOSED:	10 organisms per concentration						
CONCENTRATIONS (mg/L):	CON	250	500	1000	2000	3000	4000
NUMBER DEAD PER CONCENTRATION:	0	0	0	1	2	10	10
TEST METHODS:	As listed in EPA-821-R-02-013						
STATISTICAL METHODS:	SURVIVAL: Fisher's Exact Test						
	REPRODUCTION: ANOVA - Dunnett's						

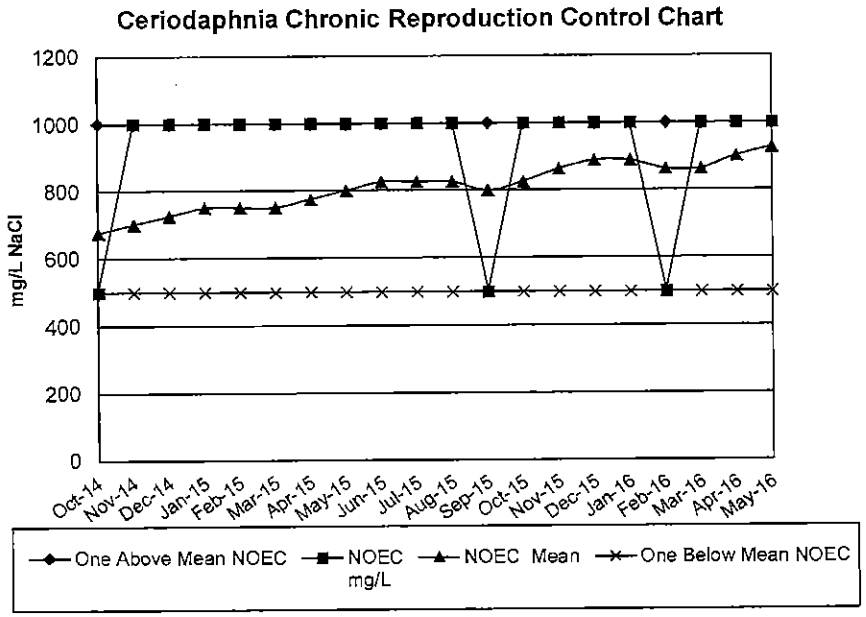
NOEC FOR SURVIVAL:	2000	mg/L
LOEC FOR SURVIVAL:	3000	mg/L
NOEC FOR REPRODUCTION:	1000	mg/L
LOEC FOR REPRODUCTION:	2000	mg/L

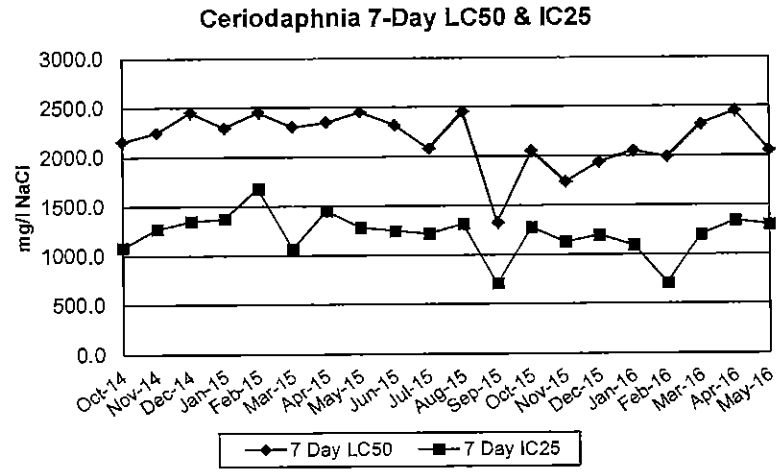
PMSD: 11.7


Ceriodaphnia Chronic Survival Control Chart
mg/L NaCl
5000
4500
4000
3500
3000
2500
2000
1500
1000
500
0
Oct-14 Nov-14 Dec-14 Jan-15 Feb-15 Mar-15 Apr-15 May-15 Jun-15 Jul-15 Aug-15 Sep-15 Oct-15 Nov-15 Dec-15 Jan-16 Feb-16 Mar-16 Apr-16 May-16
One Above Mean NOEC
NOEC mg/L
NOEC Mean
One Below Mean NOEC


Ceriodaphnia 7-Day LC50
mg/L NaCl
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
Oct-14 Nov-14 Dec-14 Jan-15 Feb-15 Mar-15 Apr-15 May-15 Jun-15 Jul-15 Aug-15 Sep-15 Oct-15 Nov-15 Dec-15 Jan-16 Feb-16 Mar-16 Apr-16 May-16
7 Day LC50
Mean LC50


Ceriodaphnia 7-Day IC25
mg/l NaCl
2000.0
1600.0
1200.0
800.0
400.0
0.0
Oct-14 Nov-14 Dec-14 Jan-15 Feb-15 Mar-15 Apr-15 May-15 Jun-15 Jul-15 Aug-15 Sep-15 Oct-15 Nov-15 Dec-15 Jan-16 Feb-16 Mar-16 Apr-16 May-16
7 Day IC25
Mean IC25


Ceriodaphnia Chronic Reproduction Control Chart
mg/L NaCl
1200
1000
800
600
400
200
0
Oct-14 Nov-14 Dec-14 Jan-15 Feb-15 Mar-15 Apr-15 May-15 Jun-15 Jul-15 Aug-15 Sep-15 Oct-15 Nov-15 Dec-15 Jan-16 Feb-16 Mar-16 Apr-16 May-16
One Above Mean NOEC
NOEC mg/L
NOEC Mean
One Below Mean NOEC


Ceriodaphnia 7-Day LC50 & IC25
mg/l NaCl
3000.0
2500.0
2000.0
1500.0
1000.0
500.0
0.0
Oct-14 Nov-14 Dec-14 Jan-15 Feb-15 Mar-15 Apr-15 May-15 Jun-15 Jul-15 Aug-15 Sep-15 Oct-15 Nov-15 Dec-15 Jan-16 Feb-16 Mar-16 Apr-16 May-16
7 Day LC50
7 Day IC25

Appendix B

Pimephales promelas

BIO-AQUATIC TESTING, INC.

Carrollton, TX

REFERENCE TOXICANTS

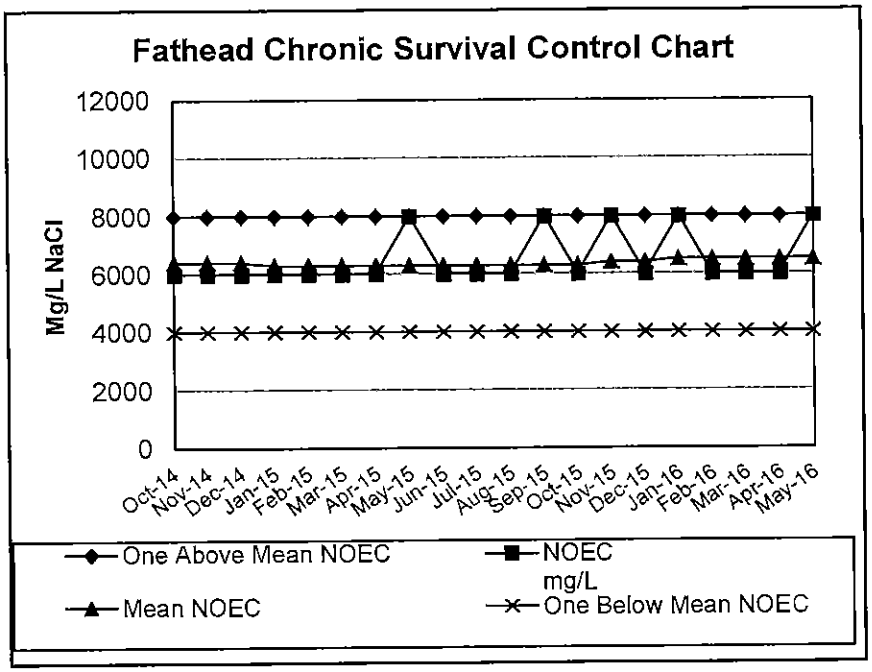
Bio-Aquatic Testing conducts reference toxicant testing monthly for organisms cultured in-house. For studies requiring purchased organisms, reference toxicant testing is performed simultaneously. Reference toxicant testing validates data and measures organism consistency. Only reagent grade chemicals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

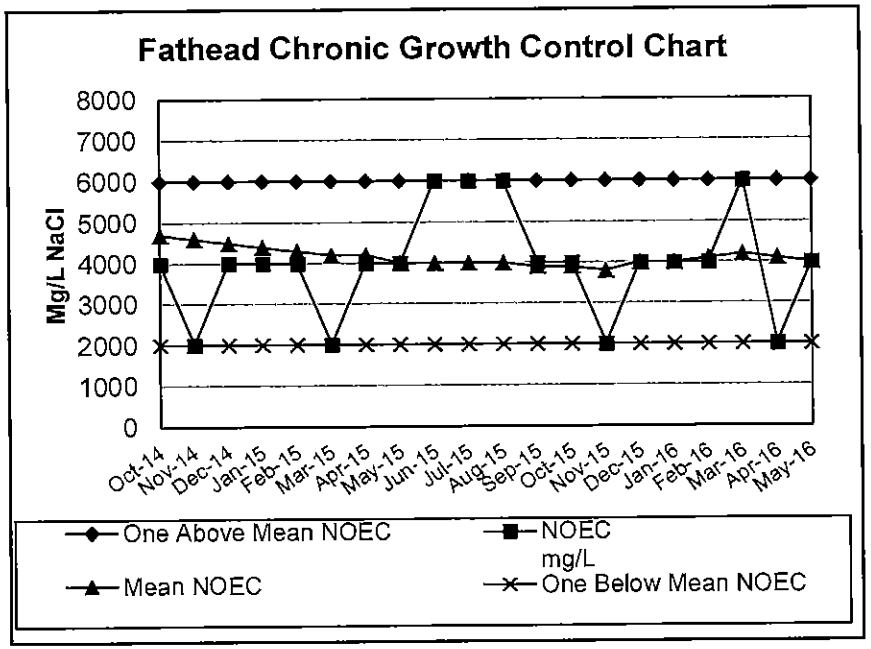
CHRONIC REFERENCE TOXICANT TEST RESULTS

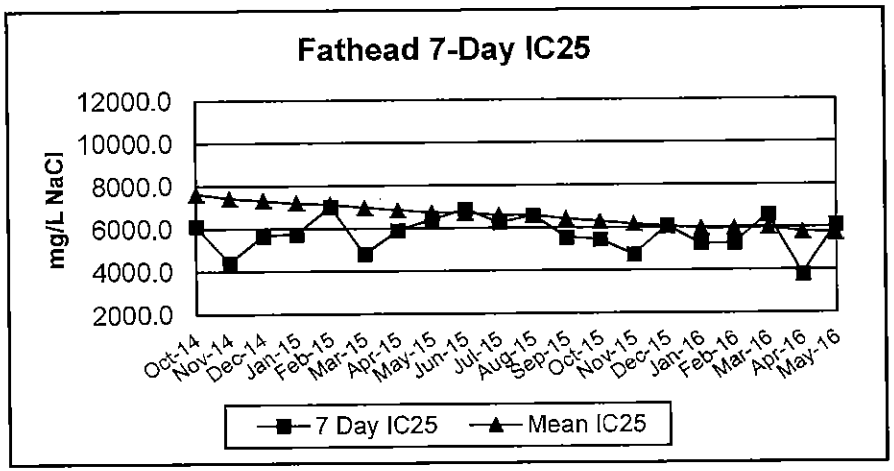
DILUTION WATER:	Standard Synthetic Freshwater						
CHEMICAL:	Sodium Chloride						
DURATION:	7 Days						
TEST NUMBER:	295						
PROJECT NUMBER:	61896						
START DATE:	5/31/2016						
START TIME:	13:20						
TOTAL NUMBER EXPOSED:	40 organisms per concentration						
CONCENTRATIONS (mg/L):	CON	2000	4000	6000	8000	10000	12000
NUMBER DEAD PER CONCENTRATION:	4	4	3	5	14	38	40
TEST METHODS:	As listed in EPA-821-R-02-013						
STATISTICAL METHODS:	SURVIVAL: Steel's Many-One Rank Test GROWTH: ANOVA and Dunnett's Test						

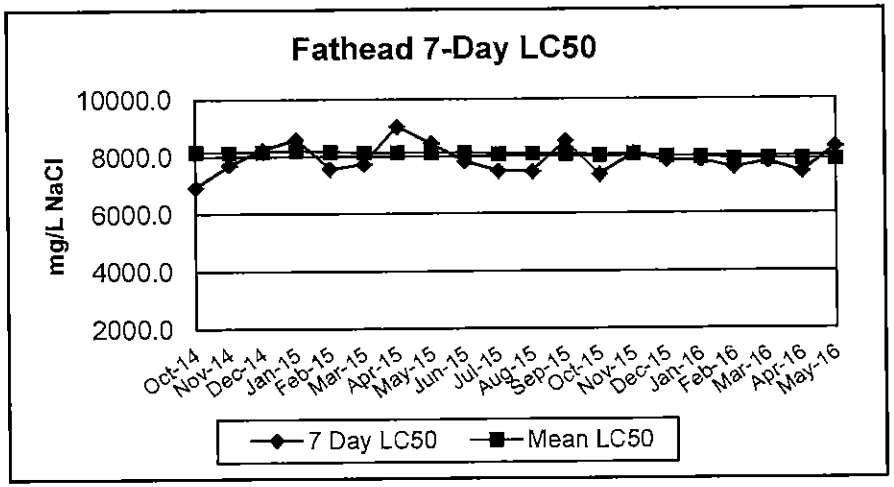
NOEC FOR SURVIVAL:	8000	mg/L
LOEC FOR SURVIVAL:	10000	mg/L
NOEC FOR GROWTH:	4000	mg/L
LOEC FOR GROWTH:	6000	mg/L

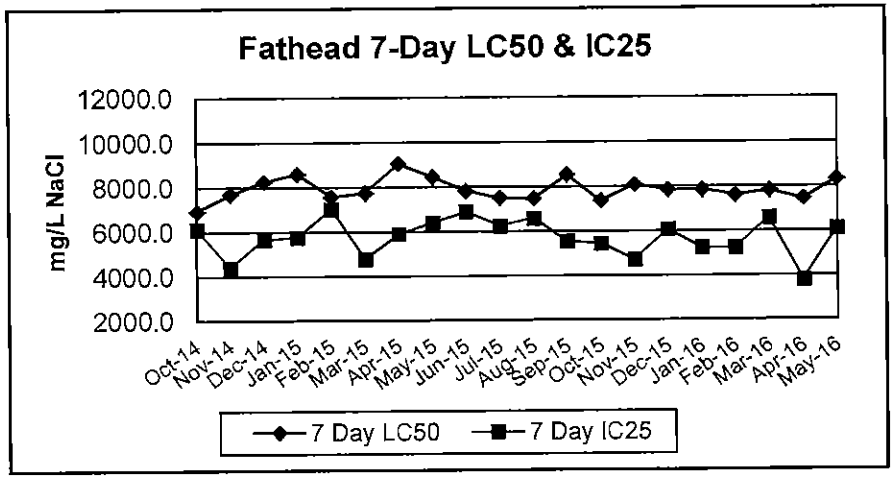
PMSD: 18.4


Fathead Chronic Survival Control Chart
Mg/L NaCl
12000
10000
8000
6000
4000
2000
0
Oct-14 Nov-14 Dec-14 Jan-15 Feb-15 Mar-15 Apr-15 May-15 Jun-15 Jul-15 Aug-15 Sep-15 Oct-15 Nov-15 Dec-15 Jan-16 Feb-16 Mar-16 Apr-16 May-16
One Above Mean NOEC
NOEC mg/L
Mean NOEC
One Below Mean NOEC


Fathead Chronic Growth Control Chart
Mg/L NaCl
8000
7000
6000
5000
4000
3000
2000
1000
0
Oct-14 Nov-14 Dec-14 Jan-15 Feb-15 Mar-15 Apr-15 May-15 Jun-15 Jul-15 Aug-15 Sep-15 Oct-15 Nov-15 Dec-15 Jan-16 Feb-16 Mar-16 Apr-16 May-16
One Above Mean NOEC
NOEC mg/L
Mean NOEC
One Below Mean NOEC


Fathead 7-Day IC25
mg/L NaCl
12000.0
10000.0
8000.0
6000.0
4000.0
2000.0
Oct-14 Nov-14 Dec-14 Jan-15 Feb-15 Mar-15 Apr-15 May-15 Jun-15 Jul-15 Aug-15 Sep-15 Oct-15 Nov-15 Dec-15 Jan-16 Feb-16 Mar-16 Apr-16 May-16
7 Day IC25
Mean IC25


Fathead 7-Day LC50
mg/L NaCl
10000.0
8000.0
6000.0
4000.0
2000.0
Oct-14 Nov-14 Dec-14 Jan-15 Feb-15 Mar-15 Apr-15 May-15 Jun-15 Jul-15 Aug-15 Sep-15 Oct-15 Nov-15 Dec-15 Jan-16 Feb-16 Mar-16 Apr-16 May-16
7 Day LC50
Mean LC50


Fathead 7-Day LC50 & IC25
mg/L NaCl
12000.0
10000.0
8000.0
6000.0
4000.0
2000.0
Oct-14 Nov-14 Dec-14 Jan-15 Feb-15 Mar-15 Apr-15 May-15 Jun-15 Jul-15 Aug-15 Sep-15 Oct-15 Nov-15 Dec-15 Jan-16 Feb-16 Mar-16 Apr-16 May-16
7 Day LC50
7 Day IC25

APPENDIX C

LITERATURE REFERENCES

U.S.E.P.A., 2002. Short-Term Methods For Estimating The Chronic Toxicity Of Effluents And Receiving Water To Freshwater Organisms (Fifth Edition) U.S. Environmental Protection Agency, Office of Water, Washington D.C., EPA-821-R-02-012.

U.S.E.P.A., 2002. Short-Term Methods For Estimating The Chronic Toxicity Of Effluents and Receiving Water To Marine And Estuarine Organisms (Third Edition) U.S. Environmental Protection Agency, Office of Water, Washington D.C., EPA-821-R-02-014.

U.S.E.P.A., 2002. Short-Term Methods For Estimating The Chronic Toxicity Of Effluents And Receiving Water To Freshwater Organisms (Fourth Edition) U.S. Environmental Protection Agency, Office of Water, Washington D.C., EPA-821-R-02-013.

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U.S.E.P.A., 1995. Short-Term Methods For Estimating The Chronic Toxicity Of Effluents And Receiving Water To West Coast Marine and Estuarine Organisms (First Edition) U.S. Environmental Protection Agency, EPA-600-R-95-136.

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U.S.E.P.A., 1991. Technical Support Document For Water Quality-Based Toxics Control, U.S. Environmental Protection Agency, EPA-505-2-90-001.

Zarr, Jerrold, H., 1984. Biostatistical Analysis, (Second Edition). Prentice-Hall, Inc., Englewood Cliffs, N.J.

CHAIN-OF-CUSTODY SHEETS

Appendix D

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

CHAIN OF CUSTODY

☐ Bio Only. No Sample Left

Lab Id : 62453

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

Sample No: 62453 –

Check Sample No. : ✓ First, ____ Second, or ____ Third.

P.O. No:

Client: Cumming, City of

Facility: WPCP

Permit No: GA0046019

Outfall: 001

Client Contact: JIMMY ANDREWS / Linda Lea

Client Phone: 770-781-2007 7-781-2018

A. REVIEW SCHEDULED TEST(s):

Chronic	Ceriodaphnia dubia
Chronic	Pimephales promelas

To Ship the 1st Sample on: 6/13/2016

Concentration: 6 12 24 48 95

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

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

Freshwater Species					Saltwater Species	
C. dubia (water flea)	*D. pulex (water flea)*	*D. magna (water flea)*	*P. promelas (minnow)*	*Selenastrum (green algae)*	*M. beryllina (minnow)*	*Mysidopsis (shrimp)*
☐Chronic ☐96 Hour ☐48 Hour ☐24 Hour	☐Chronic ☐96 Hour ☐48 Hour ☐24 Hour	☐Chronic ☐96 Hour ☐48 Hour ☐24 Hour	☐Chronic ☐96 Hour ☐48 Hour ☐24 Hour	☐96 Hour ☐48 Hour ☐24 Hour	☐Chronic ☐96 Hour ☐48 Hour ☐24 Hour	☐Chronic ☐96 Hour ☐48 Hour ☐24 Hour

Notes: Annual Chronic Cerio/Fathead (BG)

C.

	Sample ID or Location: (Outfall No. or Name)	Sample Type: E = Effluent RS = Rec. Stream S = Sediment	Sample Date From	Sample Date To	Sample Time (military) From	Sample Time (military) To	Grab or Composite	Sampled By: (Sign and Print Name)	Number Of Containers Shipped
1	Eff. Dischg. to Big Creek	E	6/12/16	6/13/16	9:30A	9:30A	C	Linda Lea [signature]	1
2									
3									

D.

	Relinquished By:	Date	Time	Received By:	Date	Time
1	Linda Lea	6/13/15	4P			
2						
3				Josh Rae	6-14-16	1120

Bio-Aquatic Sample Login

BAT sample personnel: ○ Yes ● No

Check for Ammonia: ○ Yes ○ No

Dechlorinate Sample: ○ Yes ● No

Dilution Water: ○ Receiving Stream ○ Synthetic Lab

Date: 6-14-16 Time: 1120 By: [illegible]

Temperature: 3.9 (C) IR#: [illegible] Int. Salinity: ppt Adj. Salinity: ppt

Chlorine: <0.1 mg/l Ammonia: <0.25 Other:

pH: 7.6 DO: 9.1 mg/l Condition: Good

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

CHAIN OF CUSTODY

☐ Bio Only. No Sample Left

Lab Id : 62453

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

Sample No: 62453 – ____

Check Sample No. : ____ First, ✓ Second, or ____ Third.

P.O. No:

Client: Cumming, City of

Facility: WPCP

Permit No: GA0046019

Outfall: 001

Client Contact: JIMMY ANDREWS / Linda Lea

Client Phone: 770-781-2007 770-981-2018

A. REVIEW SCHEDULED TEST(s):

Chronic	Ceriodaphnia dubia
Chronic	Pimephales promelas

Concentration: 6 12 24 48 95

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

To Ship the 1st Sample on: 6/13/2016

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

Freshwater Species					Saltwater Species	
C. dubia (water flea)	*D. pulex (water flea)*	*D. magna (water flea)*	*P. promelas (minnow)*	*Selenastrum (green algae)*	*M. beryllina (minnow)*	*Mysidopsis (shrimp)*
☐Chronic	☐Chronic	☐Chronic	☐Chronic	☐96 Hour	☐Chronic	☐Chronic
☐96 Hour	☐96 Hour	☐96 Hour	☐96 Hour	☐48 Hour	☐96 Hour	☐96 Hour
☐48 Hour	☐48 Hour	☐48 Hour	☐48 Hour	☐24 Hour	☐48 Hour	☐48 Hour
☐24 Hour	☐24 Hour	☐24 Hour	☐24 Hour		☐24 Hour	☐24 Hour

Notes: Annual Chronic Cerio/Fathead (BG)

C.

	Sample ID or Location: (Outfall No. or Name)	Sample Type: E = Effluent RS = Rec. Stream S = Sediment	Sample Date From	Sample Date To	Sample Time (military) From	Sample Time (military) To	Grab or Composite	Sampled By: (Sign and Print Name)	Number Of Containers Shipped
1	Eff. Dischg. to Big Creek	E	6/14/16	6/15/16	9:30A	9:30A	C	Linda Lea [signature]	1
2									
3									

D.

	Relinquished By:	Date	Time	Received By:	Date	Time
1	Linda Lea	6/15/16	3P	[signature]	6/16/16	16:30
2						
3						

Bio-Aquatic Sample Login

1st used 6/17/16 [signature]

BAT sample personnel: ○ Yes ◉ No

Check for Ammonia: ○ Yes ○ No

Dechlorinate Sample: ○ Yes ◉ No

Dilution Water: ○ Receiving Stream C ◉ Synthetic Lab

Date: 6/16/16		Time: 16:30		By: CR	
Temperature: 4.1 (C)	IR#: 002	Int. Salinity: ppt		Adj. Salinity: ppt	
Chlorine: <0.1 mg/l		Ammonia: <0.25		Other:	
pH: 7.5		DO: 8.6 mg/l		Condition: Good	

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

CHAIN OF CUSTODY

☐ Bio Only: No Sample Left

Lab Id : 62453

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

Sample No: 62453 –

Check Sample No. : ____ First, ____ Second, or ✓ Third.

P.O. No:

Client: Cumming, City of

Facility: WPCP

Permit No: GA0046019

Outfall: 001

Client Contact: JIMMY ANDREWS / Linda Lea

Client Phone: 770-781-2007 7-781-2018

A. REVIEW SCHEDULED TEST(s):

Chronic	Ceriodaphnia dubia
Chronic	Pimephales promelas

Concentration: 6 12 24 48 95

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

To Ship the 1st Sample on: 6/13/2016

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

Freshwater Species					Saltwater Species	
C. dubia (water flea)	*D. pulex (water flea)*	*D. magna (water flea)*	*P. promelas (minnow)*	*Selenastrum (green algae)*	*M. beryllina (minnow)*	*Mysidopsis (shrimp)*
☐Chronic ☐96 Hour ☐48 Hour ☐24 Hour	☐Chronic ☐96 Hour ☐48 Hour ☐24 Hour	☐Chronic ☐96 Hour ☐48 Hour ☐24 Hour	☐Chronic ☐96 Hour ☐48 Hour ☐24 Hour	☐96 Hour ☐48 Hour ☐24 Hour	☐Chronic ☐96 Hour ☐48 Hour ☐24 Hour	☐Chronic ☐96 Hour ☐48 Hour ☐24 Hour

Notes: Annual Chronic Cerio/Fathead (BG)

C.

	Sample ID or Location: (Outfall No. or Name)	Sample Type: E = Effluent RS = Rec. Stream S = Sediment	Sample Date From	Sample Date To	Sample Time (military) From	Sample Time (military) To	Grab or Composite	Sampled By: (Sign and Print Name)	Number Of Containers Shipped
1	Eff. Dischg. to Big Creek	E	6/16/16	6/17/16	9:30A	9:30A	C	Linda Lea	1
2									
3									

D.

	Relinquished By:	Date	Time	Received By:	Date	Time
1	Linda Lea	6/17/16	3P		6-20-16	1030
2						
3						

Bio-Aquatic Sample Login

Rec. SUSD
OHT DCR

BAT sample personnel: ○ Yes ● No

Check for Ammonia: ○ Yes ○ No

Dechlorinate Sample: ○ Yes ● No

Dilution Water: ○ Receiving Stream ○ Synthetic Lab

Date: 6-20		Time: 1054		By: C	
Temperature: 2.4 (C)	IR#: 002	Int. Salinity:	ppt	Adj. Salinity:	ppt
Chlorine: 0.1 mg/l		Ammonia: 0.21		Other:	
pH: 7.5		DO: 9.4 mg/l		Condition: Good	

REGULATORY AGENCY TABLES

Appendix E

Table 1 (Sheet 1 of 4)

BIOMONITORING REPORT

Ceriodaphnia dubia SURVIVAL AND REPRODUCTION TEST

Permittee: Cumming, City of - WPCP
Permit No.: GA0046019
Outfall No.: 001

		Date/Time		Date/Time
Dates and times Composites were collected:	FROM:	6/12/2016 @09:30	TO:	6/13/2016@ 09:30
	FROM:	6/14/2016 @09:30	TO:	6/15/2016@ 09:30
	FROM:	6/16/2016 @09:30	TO:	6/17/2016@ 09:30

Sample three was received and used out of hold time.

Test Initiation: Time: 16:49 Date: 6/14/2016

Dilution Water Used: [ ] Receiving Water [X] Synthetic Dilution Water

NUMBER OF YOUNG PRODUCED PER ADULT AT TEST TERMINATION

	EFFLUENT CONCENTRATION (%)					
REPLICATE	0%	6 %	12 %	24 %	48 %	95 %
A	29	26	29	43	29	32
B	D- 14	28	28	27	27	28
C	D- 19	33	34	29	23	22
D	24	31	31	27	24	25
E	26	31	29	32	23	25
F	34	30	D- 9	24	28	27
G	28	30	30	28	37	22
H	27	28	35	31	28	30
I	26	32	31	29	28	39
J	26	32	28	30	25	38
MEAN	27.5	30.1	30.5	30	27.2	28.8
CV % [1]	10.9	7.2	8.2	16.9	15	20.8
PMSD	Acceptable Range 47 or Less					21.5 %

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

Table 1 (Sheet 2 of 4)

BIOMONITORING REPORT

Ceriodaphnia dubia SURVIVAL AND REPRODUCTION TEST

Permittee: Cumming, City of -WPCP

Permit No.: GA0046019

Outfall No.: 001

PERCENT SURVIVAL

	EFFLUENT CONCENTRATION (%)					
Time of Reading	0%	6 %	12 %	24 %	48 %	95 %
24 HOURS	100.0	100.0	100.0	100.0	100.0	100.0
48 HOURS	100.0	100.0	100.0	100.0	100.0	100.0
7-DAY	80.0	100.0	90.0	100.0	100.0	100.0

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

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

CRITICAL DILUTION (95 %) : _____ YES ____X____ NO

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

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

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

CRITICAL DILUTION (95 %) : _____ YES ____X____ NO

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

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

a. NOEC Survival = ____95____ % Effluent (Parameter TOP3B)

b. LOEC Survival = ____Q*____ % Effluent (Parameter TXP3B)

c. NOEC Reproduction = ____95____ % Effluent (Parameter TPP3B)

d. LOEC Reproduction = ____Q*____ % Effluent (Parameter TYP3B)

Q* refers to a value that is not calculable

Table 1 (Sheet 3 of 4)
BIOMONITORING REPORT

Pimephales promelas SURVIVAL AND GROWTH TEST

Permittee: Cumming, City of -WPCP
Permit No.: GA0046019
Outfall No.: 001

		Date/Time		Date/Time
Dates and times Composites were collected:	FROM:	6/12/2016 @ 09:30	TO:	6/13/2016@ 09:30
	FROM:	6/14/2016 @ 09:30	TO:	6/15/2016@ 09:30
	FROM:	6/16/2016 @ 09:30	TO:	6/17/2016@ 09:30

Sample three was received and used out of hold time.

Test Initiation: Time: 17:30 Date: 6/14/2016

Dilution Water Used: [ ] Receiving Water [X] Synthetic Dilution Water

DATA TABLE FOR GROWTH OF *Pimephales promelas*

Effluent Concentration	Average Dry Weight in milligrams (mg) per replicate					Mean Dry Weight (mg)	CV % [1]
	A	B	C	D	E		
0%	0.406	0.519	0.513	0.394	0.519	0.470	13.74
6 %	0.514	0.489	0.418	0.434	0.425	0.456	9.41
12 %	0.594	0.370	0.576	0.510	0.550	0.520	17.24
24 %	0.453	0.608	0.586	0.499	0.634	0.556	13.78
48 %	0.584	0.542	0.549	0.569	0.765	0.602	15.42
95 %	0.766	0.435	0.456	0.558	0.537	0.551	23.86
PMSD	Acceptable Range 30 or Less					27.7 %	

[1] Coefficient of Variation = (standard deviation/mean) x 100)

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

DATA TABLE FOR SURVIVAL OF *Pimephales promelas*

Effluent Concentration	Percent Survival per replicate					Average % Survival			CV % [1]
	A	B	C	D	E	24 Hours	48 Hours	7-Day	
0%	87.5	87.5	100	62.5	87.5	100	97.5	85	16.11
6 %	100	100	87.5	87.5	87.5	100	100	92.5	7.40
12 %	100	75	100	100	87.5	100	100	92.5	12.09
24 %	75	100	100	75	87.5	100	97.5	87.5	14.29
48 %	87.5	87.5	75	75	75	100	97.5	80	8.56
95 %	100	75	75	62.5	75	100	100	77.5	17.67

Table 1 (Sheet 4 of 4)

BIOMONITORING REPORT

Pimephales promelas SURVIVAL AND GROWTH TEST

Permittee: Cumming, City of -WPCP

Permit No.: GA0046019

Outfall No.: 001

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

Is the mean dry weight at 7 days significantly less (p=0.05) than the control's mean dry weight for the % effluent corresponding to significant non-lethal effects?

CRITICAL DILUTION (95 %) : _____ YES ____X____ NO

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

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

CRITICAL DILUTION (95 %) : _____ YES ____X____ NO

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

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

			For DMR Form:
a.	NOEC Survival =	95 % Effluent	(Parameter TOP6C)
b.	LOEC Survival =	Q* % Effluent	(Parameter TXP6C)
c.	NOEC Growth =	95 % Effluent	(Parameter TPP6C)
d.	LOEC Growth =	Q* % Effluent	(Parameter TYP6C)

Q* refers to a value that is not calculable