Camden Water Utilities
P. O. Box J
Camden, AR 71711

Camden Water Utilities

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ADEQ

5301 Northshore Drive

North Little Rock, Ar. 72118-5317

May 15, 2019

Attention Gavin Gray Office of Water Quality

RE: Missing Lab Reports for Wet Testing (NPDES Permit No: AR0022365)

Mr. Gray, I have in closed the copies of the missing lab reports for the wet testing for the four quarters of 2018, and the first quarter of 2019. These were the quarter's we spoke about on the phone on May 14, 2019. I hope this will help finalize our reduction request for our Wet Testing.

In the future I will attach the Lab Test results to the DMR's. Thank you so much for your time and help that you spent with me on the phone. If you need to reach me you can contact me by phone (870)836-4329 or by e-mail keithballard101@yahoo.com.

Thanks

Keith Ballard

Keith Ballard

Wastewater Plant Supervisor

Camden Water Utilities

Bio-Analytical Laboratories (BAL)
ADEQ #880630
Project X6643

Bio-Analytical Laboratories' Executive Summary

Permittee: Camden Water Utilities
P.O. Box J
Camden, AR 71711
Project #: X6643
Outfall: 002 (treated sanitary wastewater)
Permit #: AR0022365/ AFIN 52-00073
Contact: Mr. Keith Ballard
Test Dates: March 28 - April 20, 2018
Test Type: 48-hour Acute Definitive Toxicity Test using *Pimephales promelas*-
(EPA Method 2000.0)- 3/28/18 - 3/30/18
48-hour Acute Definitive Toxicity Test using *Daphnia pulex*
(EPA Method 2021.0)- 4/18/18 - 4/20/18- VALID TEST

Results:

For *Daphnia pulex:*
1. If the NOEC for survival is less than the critical dilution (28.0%), enter a "1"; otherwise, enter a "0" for Parameter No. TEM3D - 0 **(Pass).**
2. Report the NOEC value for survival, Parameter No. TOM3D - 37.0%.
3. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQM3D- 11.68%.
-Note: Receiving water invalidated the test initiated on 3/28/18.

For *Pimephales promelas:*
1. If the NOEC for survival is less than the critical dilution (28.0%), enter a "1"; otherwise, enter a "0" for Parameter No. TEM6C - 0 **(Pass).**
2. Report the NOEC value for survival, Parameter No. TOM6C - 37.0%.
3. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQM6C - 0.00%.

This report contains a total of 48 pages, including this page. The information within pertains only to the samples listed in the chain of custody documents. The results comply with the 2009 TNI standard. The chemical data recorded in this report are for monitoring purposes only and should not be reported on discharge monitoring reports.

Bio-Analytical Laboratories

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THE RESULTS OF TWO 48-HOUR ACUTE DEFINITIVE TOXICITY TESTS FOR OUTFALL 002 AT

CAMDEN WATER UTILITIES
Camden, Arkansas

NPDES #AR0022365
AFIN #52-00073

EPA Methods 2000.0 and 2021.0

Project X6643

Test Dates: March 28 - April 20, 2018

Report Date: April 26, 2018

Prepared for:
Mr. Keith Ballard
Camden Water Utilities
P.O. Box J
Camden, AR 71711

Prepared by:
Ginger Briggs
Bio-Analytical Laboratories
P.O. Box 527
Doyline, LA 71023
ADEQ #880630

TABLE OF CONTENTS

1.0 Introduction	4
2.0 Methods and Materials	4
2.1 Test Methods	4
2.2 Test Organisms	4
2.3 Dilution Water	4
2.4 Test Concentrations	5
2.5 Sample Collection	5
2.6 Sample Preparation	5
2.7 Monitoring of the Tests	5
2.8 Data Analysis	5
3.0 Results and Discussion	6
4.0 Conclusions	7
5.0 References	8
Appendices	
A- Chain-of-Custody Documents	9
B- Raw Data Sheets	12
C- Invalid Test Raw Data Sheets	24
D- Statistical Analyses	32
E- Quality Assurance Charts	37
F- Agency Forms	42
G- Report Quality Assurance Form	47

1.0 Introduction

Bio-Analytical Laboratories (BAL), Doyline, Louisiana conducted two 48-hour acute definitive toxicity tests for Outfall 002 at the wastewater treatment plant operated by Camden Water Utilities, Camden, Arkansas . Such testing will determine compliance with the Water Quality Standard, of greater than 50 percent survival of the appropriate test organism in the defined low-flow effluent concentration (critical dilution) for a 48-hour period. The test organisms used were the cladoceran, *Daphnia pulex* and the fathead minnow, *Pimephales promelas.* The test endpoints are the No-Observed-Effect-Concentration (NOEC), which is defined as the highest effluent concentration that is not statistically different from the control, and the Lethal Concentration (LC_{50}), which is the effluent concentration at which 50 percent of the test organisms die.

The tests were initiated on March 28, 2018; however, the *Daphnia pulex* test was invalid because the receiving water, used as the dilution water and the control, did not meet the test acceptance requirements. It was initiated again on April 18, 2018. This report summarizes the valid test data. All valid and invalid data can be found in the appendices.

2.0 Methods and Materials

2.1 Test Methods

All methods followed were according to the latest edition of "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms" (EPA-821-R-02-012), "Standard Methods (SM) for The Examination of Water and Wastewater. 20th Edition" (APHA 1998. Each chemical method listed in the report as SM 1997) and BAL's standard operating procedure.

2.2 Test Organisms

The *Daphnia pulex* test organisms were cultured in-house at test temperature and were less than 24 hours old at test initiation. The fathead minnows were also raised in-house at test temperature and were 6 days old at test initiation. Forty-eight hour reference toxicant tests were conducted a minimum of once monthly in order to document organism sensitivity.

2.3 Dilution Water

Grab samples of receiving water, collected upstream from Outfall 002, were used as the dilution water and the control for the minnow test. Soft reconstituted water, made per EPA guidelines, was used as the dilution water and control for the daphnid test.

2.4 Test Concentrations

The test concentrations used in the acute toxicity tests were 37.0, 28.0, 21.0, 16.0 and 12.0 percent effluent and the appropriate control. The critical dilution was defined as 28.0 percent effluent. The tests were conducted using 5 replicates of 8 animals each for a total of 40 animals per concentration.

2.5 Sample Collection

Two 24-hour composite samples of Outfall 002 were collected by Camden Water Utilities personnel on March 27 and 28, 2018, at 0800 hours. Grab samples of receiving water were collected on March 28, 2018 at 0800 hours. For the daphnid test, two 24-hour composite samples of Outfall 002 were collected on April 17 and 18, 2018 at 0800 hours. Upon completion of collection, the samples were packed in ice and delivered to Bio-Analytical Laboratories by BAL personnel. The temperature upon arrival of each set of samples was 0.5 and 1.6^0 Celsius, respectively.

2.6 Sample Preparation

Upon arrival, the samples were logged in, given an identification number and refrigerated unless needed. Prior to use, each sample was warmed to 25 ± 1^0 Celsius. Total residual chlorine levels (SM 4500-Cl E) were measured in milligrams/Liter (mg/L) with a Capital Controls^R amperometric titrator and recorded if present. Total ammonia levels were measured in mg/L using a test strip. The receiving water was filtered through a 60 micron plankton net in order to remove any wild organisms that may cause test interference. Dissolved oxygen (SM 4500-O G), pH (SM 4500-H+ B) and conductivity (SM 2510 B) measurements, in mg/L, standard units and umhos/cm, respectively, were taken on the control and each test concentration at test initiation, at test renewal and at test termination. Alkalinity (SM 2320B) and hardness (SM 2340 C) levels were measured in mg/L as $CaCO_3$ on the control and the highest effluent concentration.

2.7 Monitoring of the Tests

The tests were run in a Precision^R dual programmable illuminated incubator set at a temperature of 25 ± 1^0 Celsius. An AEMC^R data logger was used to monitor diurnal temperature throughout the testing period. Light cycle and intensity were recorded twice a month.

2.8 Data Analysis

Survival data was analyzed using the ToxCalc v5.0.23 statistical program to obtain the No- Observed- Effect- Concentration (NOEC) values. The LC_{50} values were also obtained using the ToxCalc program.

3.0 Results and Discussion

The results of the definitive tests can be found in Table 1. The mean survival in the 28.0 percent critical dilution was greater than 50 percent after 48 hours of exposure in both tests. The NOEC value for the *Daphnia pulex* and the fathead minnow test was 37.0 percent effluent (p.= .05). The 48-hour LC_{50} value for the *Daphnia pulex* and fathead minnow test was >37.0 percent effluent (p=.05).

Table 1: Results of the 48-hour Acute Definitive Toxicity Tests

Percent Effluent	Percent Survival	
Test Organism	*D. pulex*	*P.promelas*
Control	97.5	100.0
12.0	90.0	95.0
16.0	97.5	100.0
21.0	92.5	100.0
28.0	90.0	100.0
37.0	90.0	97.5

The 48-hour reference toxicant test results indicate that the test organisms were within the respective sensitivity range. The graphs of the results of the acute reference toxicant tests can be found in Appendix D- Quality Assurance Charts.

4.0 Conclusions

The two composite samples of Outfall 002 collected from Camden Water Utilities' wastewater treatment plant on March 27 and 28, 2018, were not found to be lethally toxic to the *Pimephales promelas* test organisms in the 28.0 percent critical dilution after 48 hours of exposure (p=.05). The two composite samples of Outfall 002 collected on April 17 and 18, 2018, were not found to be lethally toxic to the *Daphnia pulex* test organisms in the 28.0 percent critical dilution after 48 hours of exposure (p=.05). The receiving water, used as the dilution water and the control, invalidated the first daphnid test initiated on March 28, 2018, because it did not meet the test acceptance requirements.

5.0 References

EPA, 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. EPA-821-R-02-012, 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

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

Laboratory Use Only:

Company: Camden Water Utilities
Phone: (870) 836-4329

Address: P.O. Box J, Camden, AR 71711
Fax: (870) 836-5190

Permit #: AR0022365/ AFIN 52-00073
Purchase Order:

Sampler's Signature/Printed Name/Affiliation: Annette Strickland Annette Strickland

Analysis:

Project Number: X6643
Temp. upon arrival: 0.5
Therm#: 29
Color: tan
Odor: None
Tech: EDW 3/28/18
Preservative: (below)

Date Start / Date End	Time Start / Time End	C	G	# and type of container	Sample Identification	Chronic Ceriodaphnia	Chronic minnow	Acute minnow(fresh/marine)	Acute Daphnia species	Acute Mysid	Acute Ceriodaphnia	Fecal Coliform	Lab Control Number:	Preservative
8-26-18 / 8-27-18	8:00 Am / 8:00 Am	X		2 half gallons	002- Day 1			X	X				C15040	ICE
8-27-18 / 8-28-18	8:00 Am / 8:00 Am	X		2 half gallons	002- Day 2			X	X				C15041	↓
~~8-...~~ 8-28-18	8:00 A		X	6 half gallons	Rec Water			X	X				C15042	↓

(margin note: 3/26-28/18 EB 3/28/18)

Relinquished by/Affiliation:	Date:	Time:	Received by/Affiliation:	Date:	Time:
Mike Langley oper	3-28-18	1045	[signature]	3-28-18	1045
[signature]	3-28-18	1315	Emgmore	3/28/18	1315

Method of Shipment: ✓ Lab ___ Bus ___ Fed Ex ___ DHL ___ UPS ___ Client ___ Other Tracking #___

Comments:

COC Rev. 3.1

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

Laboratory Use Only:

Company: Camden Water Utilities	Phone: (870) 836-4329	Analysis:								
Address: P.O. Box J, Camden, AR 71711	Fax: (870) 836-5190									
Permit #: AR0022365/ AFIN 52-00073	Purchase Order:									
Sampler's Signature/Printed Name/Affiliation: Annette Strickland / Annette Strickland										

Date Start / Date End	Time Start / Time End	C	G	# and type of container	Sample Identification	Chronic Ceriodaphnia	Chronic minnow	Acute minnow(fresh/marine)	Acute Daphnia species	Acute Mysid	Acute Ceriodaphnia	Fecal Coliform	Lab Control Number:	Project Number: X6643 / Temp. upon arrival: 1.6 / Therm#: 29 / Color: Clear / Odor: Septic / Tech: EDW / Preservative: (below)
4-16-18 / 4-17-18	0600 / 0800	X		2 half gallons	002- Day 1				X				C15158	ICE
4-17-18 / 4-18-18	0800 / 0800	X		2 half gallons	002- Day 2				X				C15159	ICE

& EDB 4/18/18

Relinquished by/Affiliation:	Date:	Time:	Received by/Affiliation:	Date:	Time:
Mike Langley	4-18-18	930	Cindy Briggs	4/18/18	0935
Relinquished by/Affiliation:	Date:	Time:	Received by/Affiliation:	Date:	Time:
Cindy Briggs	4/18/18	1240	Emily Moore	4/18/18	1240

Method of Shipment: ✓ Lab ____ Bus ____ Fed Ex ____ DHL ____ UPS ____ Client ____ Other Tracking #____

Comments: ↓ Dates and times on bottles. EDB 4/18/18

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APPENDIX B
RAW DATA SHEETS

BIO-ANALYTICAL LABORATORIES
ACUTE TOXICITY TEST WATER QUALITY DATA

Project# X6643

Client: CMDN/Camden Water Utilities

Address: P.O. Box J, Camden, AR 71711

NPDES#AR0022365 Outfall 002

Technicians: EGB/LEM/EDW/MV

Test initiated: Date 3/28/18 EGB 3/30/18 Time 1500

Test terminated: Date 3/30/18 Time 1405

Dissolved Oxygen Meter: Model # YSI 550A Serial #06E2089 AV
pH Meter: Model #Orion 230A+ Serial #015253
Conductivity Meter: Model # Fisher Serial #130168768
Amperometric Titrator: Model #Fischer-Porter Serial #92W445766

Sample Information

Sample ID#	Initial D.O. (mg/L and %)	Aerate? Minutes/ Final D.O(mg/L & %)	Total Residual Chlorine (mg/L)	Dechlorinated? Amount?	Ammonia (NH3) mg/L	Salinity	Hardness	Alkalinity	Tech
C15040	8.4/111.6	Y/10 7.8/97.0	0.0	NO	3.0	N/A	36.0	20.0	MV
C15041	10.6/129.5%	Y/16/7.8 97.1%	20.01	↓	3.0	↓	84.0	21.0	LEM

Dilution Water Information

Dilution Water	ID#	Initial D.O (mg/L & %)	Aerate? Minutes/D.O (mg/L & %)	Total Residual Chlorine (mg/L)	Ammonia (NH3) mg/L	pH	Hardness	Alkalinity	Tech
⊙MV 3/28/18 ⊙MV 3/28/18 ~~Soft~~ Rec	15042	9.3/115.0	Y/16/7.7/94.0 0.0	0.0	0	6.7	24.0	12.0	MV
		9.8/127.0%	Y/16/7.7 97.3%	↓	↓	↓	↓	↓	LEM

Test Species Information

Test Species Info.	Species:D.pulex ID#: BAL A31-B30	Species:P.promelas ID#: BAL 32318	Species: ID#:	Species: ID#:
Age	< 24 hours	16 DAY old		
Test Container Size	50 ml	250 ml		
Test volume	20 ml	200 ml		
Feeding: Type	YCT/Algae	Artemia		
Amount	>/= 2 hours prior to initiation	>/= 2 hours prior to initiation		
Aeration?	N/A	N/A		
Amount				
Condition of survivors	Fair LEM 3/30/18	GOOD MV 3/30/18		

Comments:

Acutel Rev. 1.0

X6643
Page 14 of 48

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.0

Project# X6643 | Test started: Date 3/27/18 | Time 1500
Client Camden | Test ended: Date 3/30/18 | Time 1405
Sample Description 002 | Test Species P. promelas | ID# BEL 31218

Technician: 0hour MV 24hour EON 48hour MV 72hour ____ 96hour ____
Time: 0hour 1500 24hour 1120 48hour 1405 72hour ____ 96hour ____
Temperature (°C): 0hour 25.0 24hour 25.3 48hour 25.0 72hour ____ 96hour ____

Test Dilution %	Rep.	Test Salinity	# Live Organisms 0 hr	24	48	72	96	Temperature 0	24	48	72	96	Dissolved Oxygen 0	24	48	72	96	pH 0	24	48	72	96	Conductivity 0	24	48	72	96
0 REC	1	n/A	8	8	8			25.2	23.9/27.0	24.3			7.5	7.4/7.6	7.6			6.7	6.8/6.3	7.1			371	373/85.7	149.8		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
12	1		8	8	7			25.7	23.9/27.1	23.9			7.5	7.4/7.6	7.5			6.6	6.8/6.1	6.9			371	387/1120	1075		
	2		8	8	7																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								MV	EON/TM	MV			MV	EON/TM	MV			MV	EON/TM	MV			MV	EON/TM	MV		

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.0

Project# X66 43 | Test started: Date 3/28/18 Time 1500

Client Camden | Test ended: Date 3/30/18 Time 1405

Sample Description 002 | Test Species P. promelas ID# BA13228

	0hour	24hour	48hour	72hour	96hour
Technician:	mv	EDK	mv		
Time:	1500	1120	1405		
Temperature (°C):	25.0	25.3	25.0		

Test Dilution %	Rep.	Test Salinity	# Live Organisms 0 hr	24	48	72	96	Temperature 0	24	48	72	96	Dissolved Oxygen 0	24	48	72	96	pH 0	24	48	72	96	Conductivity 0	24	48	72	96
16	1	n/a	8	8	8			25.6	23.6/27.1	24.0			7.7	7.3/7.6	7.5			6.2	6.7/6.6	6.9			111.6	122/125.0	125.9		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
21	1		8	8	8			25.6	23.9/27.3	23.9			7.7	7.7/7.6	6.9			6.1	6.6/5.9	7.8			133.9	208/149	145.0		
	2		8	8	8																						
	3		8	8	7																						
	4		8	8	8																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								mv	EDK/TAM	mv			mv	EDK/TAM	mv			mv	EDK/TAM	mv			mv	EDK/TAM	mv		

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.0

Project# X6643 Test started: Date 3/28/18 Time 1500

Client Camden Test ended: Date 3/30/18 Time 1405

Sample Description 002 Test Species P. promelas ID# BAL 32218

Technician: 0hour MV 24hour EPK 48hour MV 72hour ______ 96hour ______

Time: 0hour 1500 24hour 1120 48hour 1405 72hour ______ 96hour ______

Temperature (°C): 0hour 25.0 24hour 25.3 48hour 25.0 72hour ______ 96hour ______

Test Dilution	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
%		n/A																									
28	1		8	8	8			25.3	23.1/27.3	23.9			7.7	7.5/7.6	7.6			6.5	6.7/5.9	6.8			284	288/158.3	185		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
37	1		8	8	8			25.4	23.1/27.3	23.9			7.4	7.6/7.7	7.5			6.6	6.6/5.8	6.8			337	339/180.0	233		
	2		8	7	7																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								MV	EPK/EM	MV			MV	EPK/EM	MV			MV	EPK/EM	MV			MV	EPK/EM	MV		

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.0)

Project# X6643 Test started: Date 3/28/18 Time 1500

Client Camden Test ended: Date 3/30/18 Time 1405

Sample Description 002 Test Species P. promelas ID# BAI 3R217

Technician: 0hour MV 24hour EDW 48hour MV 72hour ______ 96hour ______

Time: 0hour 1500 24hour 1120 48hour 1405 72hour ______ 96hour ______

Temperature (°C): 0hour 25.0 24hour 23.3 48hour 25.0 72hour ______ 96hour ______

Test Dilution	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
%		n/A	0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
Soft ✓	1		8	8	8			22.4	23.6/22.7	22.0			7.2	7.9/7.3	7.7			7.9	7.69/7.7	7.2			217	229/208	215		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								MV	EDW/SM	MV			MV	EDW/SM	MV			MV	EDW/SM	MV			MV	EDW/SM	MV		

X6643

Test: AC-Acute Fish Test							Test ID: CAMPP		
Species: PP-Pimephales promelas							Protocol: EPAAW02-EPA/821/R-02-012		
Sample ID: AR0022365							Sample Type: EFF2-Industrial		
Start Date:		End Date:					Lab ID: ADEQ880630		
Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
1	25	5	28						
2	22	2	28						
3	29	4	37						
4	3	3	D-Control						
5	4	4	D-Control						
6	28	3	37						
7	16	1	21						
8	5	5	D-Control						
9	15	5	16						
10	11	1	16						
11	17	2	21						
12	30	5	37						
13	14	4	16						
14	7	2	12						
15	13	3	16						
16	27	2	37						
17	2	2	D-Control						
18	19	4	21						
19	21	1	28						
20	18	3	21						
21	26	1	37						
22	6	1	12						
23	8	3	12						
24	24	4	28						
25	12	2	16						
26	10	5	12						
27	9	4	12						
28	1	1	D-Control						
29	20	5	21						
30	23	3	28						

Comments:

BIO-ANALYTICAL LABORATORIES
ACUTE TOXICITY TEST WATER QUALITY DATA

Project# X6643

Client: CMDN/Camden Water Utilities

Address: P.O. Box J, Camden, AR 71711

NPDES#AR0022365 Outfall 002

Technicians: EGB/LEM/EDW/MV

Test initiated: Date 4/18/18 Time 1400

Test terminated: Date 4/20/18 Time 1340

Dissolved Oxygen Meter: Model # YSI 550A Serial #06E2089 AV
pH Meter: Model #Orion 230A+ Serial #015253
Conductivity Meter: Model # Fisher Serial #130168768
Amperometric Titrator: Model #Fischer-Porter Serial #92W445766

Sample Information

Sample ID#	Initial D.O. (mg/L and %)	Aerate? Minutes/ Final D.O(mg/L & %)	Total Residual Chlorine (mg/L)	Dechlorinated? Amount?	Ammonia (NH3) mg/L	Salinity	Hardness	Alkalinity	Tech
C15158	9.7/120.3%	4/20 7.5 94.9%	<0.01	NO	1.0	N/A	28.0	24.0	EDW
C15159	9.8/120.6%	4/20 8.1 99.8%	<0.01	↓	0.0	↓	40.0	20.0	LEM

Dilution Water Information

Dilution Water	ID#	Initial D.O (mg/L & %)	Aerate? Minutes/D.O (mg/L & %)	Total Residual Chlorine (mg/L)	Ammonia (NH3) mg/L	pH	Hardness	Alkalinity	Tech
Soft Rec	4179	N/A				6.8	44.0	24.0	LEM

Test Species Information

Test Species Info.	Species:D.pulex ID#:BM,A33-C34	Species:P.promelas ID#:	Species: ID#:	Species: ID#:
Age	< 24 hours			
Test Container Size	50 ml	250 ml		
Test volume	20 ml	200 ml		
Feeding: Type	YCT/Algae	Artemia		
Amount	>/= 2 hours prior to initiation	>/= 2 hours prior to initiation		
Aeration?	N/A			
Amount	1			
Condition of survivors	mu 4/19/18 - fair			

Comments:

Acute1 Rev. 1.0

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.0

Project# X6643 — Test started: Date 4/18/17 Time 1400

Client Camden — Test ended: Date 4/19/17 Time 1340

Sample Description 002 — Test Species D. pulex — ID# BTL A33-C34

Technician: Ohour [illegible] 24hour [illegible] 48hour mv 72hour _____ 96hour _____

Time: Ohour 1400 24hour 1135 48hour 1340 72hour _____ 96hour _____

Temperature (°C): Ohour 25.1 24hour 25.5 48hour 25.5 72hour _____ 96hour _____

» mv 4/20/18

Test Dilution	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
0 soft	1	N/A	8	8	8			24.6	24.8 26.0	24.5			8.0	8.0 7.8	7.4			7.5	7.4 7.6	7.5			206	220 223	238		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	7	7																						
12%	1		8	8	8			24.9	24.7 26.1	24.5			7.9	8.0 7.8	8.5			7.5	7.3 7.4	7.5			237	225 227	237		
	2		8	8	7																						
	3		8	8	8																						
	4		8	6	6																						
	5		8	8	7																						
Chemistry Tech prerenewal/postrenewal								tam	tam	tam mv			tam	tam	tam mv			tam	tam	tam mv			tam	tam	tam mv		

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.0)

Project# X6643
Client Camden
Sample Description 002

Test started: Date 4/18/18 Time 1400
Test ended: Date 4/19/18 (20) Time 1240
Test Species D. pulex ID# BN7933-C34

Technician: Ohour lem 24hour lem 48hour mv 72hour ____ 96hour ____
Time: Ohour 1400 24hour 1135 48hour 1240 72hour ____ 96hour ____
Temperature (°C): Ohour 25.1 24hour 25.5 48hour 25.5 72hour ____ 96hour ____

* mv 4/25/18

Test Dilution %	Rep.	Test Salinity	# Live Organisms 0 hr	24	48	72	96	Temperature 0	24	48	72	96	Dissolved Oxygen 0	24	48	72	96	pH 0	24	48	72	96	Conductivity 0	24	48	72	96
16	1	N/A	8	8	8			25.1	25.6/26.2	24.5			7.9	7.8/7.8	7.4			7.3	7.2/7.2	7.5			230	223/224	239		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	7																						
	5		8	8	8																						
21	1		8	8	7			25.3	25.6/26.2	24.2			7.9	7.9/7.8	7.3			7.3	7.2/7.2	7.4			230	275/281	241		
	2		8	7	2																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								lem	lem/lem	mv			lem	lem/lem	mv			lem	lem/lem	mv			lem	lem/lem	mv		

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.0.

Project# X6643 | Test started: Date 4/18/18 | Time 1400
Client Camden | Test ended: Date 4/20/18 | Time 1340
Sample Description 002 | Test Species D. pulex | ID# BAL A33-C54

Technician: 0hour EM 24hour EM 48hour mv 72hour ____ 96hour ____
Time: 0hour 1400 24hour 1135 48hour 1340 72hour ____ 96hour ____
Temperature (°C): 0hour 25.1 24hour 25.5 48hour 25.5 72hour ____ 96hour ____

→ 4/23/18 mv

Test Dilution %	Rep.	Test Salinity	# Live Organisms 0 hr	24	48	72	96	Temperature 0	24	48	72	96	Dissolved Oxygen 0	24	48	72	96	pH 0	24	48	72	96	Conductivity 0	24	48	72	96
28	1	N/A	8	7	6			25.5	26.1/26.2	24.7			7.8	7.8/7.8	8.3			7.2	7.2/7.2	7.4			231	275/281	241		
	2		8	7	7																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	7																						
37%	1		8	8	6			25.7	26.1/26.2	24.7			7.8	7.8/7.8	8.2			7.2	7.2/7.1	7.4			231	275/222	242		
	2		8	8	7																						
	3		8	7	7																						
	4		8	8	8																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								EM	EM/am	mv			EM	EM/am	mv			EM	EM/am	mv			EM	EM/am	mv		

X6643

Test: DA-Daphnid Acute Test							Test ID: CMDN002DP		
Species: DP-Daphnia pulex							Protocol: EPAAW02-EPA/821/R-02-012		
Sample ID: AR0022365							Sample Type: EFF1-POTW		
Start Date:		End Date:					Lab ID: ADEQ1420		
Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
1	5	5	D-Control						
2	20	5	21						
3	15	5	16						
4	22	2	28						
5	19	4	21						
6	7	2	12						
7	4	4	D-Control						
8	30	5	37						
9	1	1	D-Control						
10	8	3	12						
11	17	2	21						
12	28	3	37						
13	11	1	16						
14	27	2	37						
15	14	4	16						
16	12	2	16						
17	21	1	28						
18	2	2	D-Control						
19	6	1	12						
20	13	3	16						
21	18	3	21						
22	26	1	37						
23	3	3	D-Control						
24	29	4	37						
25	10	5	12						
26	24	4	28						
27	25	5	28						
28	16	1	21						
29	23	3	28						
30	9	4	12						

Comments:

EDK 4/9/18
Reviewed by:

APPENDIX C
INVALID TEST RAW DATA SHEETS

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.0

Project# X6643

Client Camden

Sample Description 002

Test started: Date 3/28/18 Time 1455

Test ended: Date 3/30/18 Time 1400

Test Species D. pulex ID# BM A31-B30

Technician: 0hour EM 24hour EDu 48hour EM 72hour ______ 96hour ______

Time: 0hour 1455 24hour 1511 48hour 1400 72hour ______ 96hour ______

Temperature (°C): 0hour 25.8 24hour 25.6 48hour 25.0 72hour ______ 96hour ______

Test Dilution	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
%		n/A	0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
0 Rec. (EM 3/28/18)	1		8	8	6			25.7	24.1/25.0	25.0			7.5	7.8/7.6	7.8			6.7	7.1/6.3	7.3			376	382/[illegible]	84.8		
	2		8	7	7																						
	3		8	5	1																						
	4		8	5	4																						
	5		8	8	8																						
12	1		8	8	6			25.7	24.9/25.1	24.1			7.5	7.0/7.6	7.8			6.6	7.8/6.1	7.2			373	383/112	98		
	2		8	8	5																						
	3		8	8	8																						
	4		8	8	7																						
	5		8	8	7																						
Chemistry Tech prerenewal/postrenewal								MV	EDu/EM	EM			MV	EDu/EM	EM			MV	EDu/EM	EM			MV	EDu/EM	EM		

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.0

Project# X6643 — Test started: Date 3/28/18 Time 1455

Client Camden — Test ended: Date 3/30/18 Time 1400

Sample Description 002 — Test Species D. pulex ID# BALA31-1830

Technician:	Ohour LEM	24hour EDV	48hour LEM	72hour ____ 96hour ____
Time:	Ohour 1455	24hour 1511	48hour 1400	72hour ____ 96hour ____
Temperature (°C):	Ohour 25.8	24hour 25.6	48hour 25.8	72hour ____ 96hour ____

Test Dilution %	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
16	1	N/A	8	8	7			25.0	25.8 / 27.1	24.0			7.7	7.6 / 7.4	7.8			6.2	7.6 / 6.0	7.1			111.6	131 / 125	134.8		
	2		8	8	7																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
21	1		8	8	3			25.6	25.3 / 24.0				7.7	7.8 / 7.2	7.2			6.1	6.8 / 5.9	7.0			133.2	167 / 140.9	155.8		
	2		8	7	7																						
	3		8	8	8																						
	4		8	8	7																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								mv LEM					mv LEM					mv LEM					mv LEM				

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.0

Project# X6643 Test started: Date 3/28/18 Time 1455

Client Camden Test ended: Date 3/30/18 Time 1400

Sample Description OOS Test Species D. DUBIA ID# BAI A31-B30

Technician: Ohour GM 24hour EDC 48hour GM 72hour _____ 96hour _____

Time: Ohour 1455 24hour 1511 48hour 1400 72hour _____ 96hour _____

Temperature (°C): Ohour 25.8 24hour 25.6 48hour 25.8 72hour _____ 96hour _____

Test Dilution	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
%		n/A	0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
28	1		8	8	5			25.3	25.6 27.3	24.1			7.7	7.6 7.4	7.7			6.5	6.8 5.9	7.0			288	285 158.3	209		
	2		8	8	8																						
	3		8	8	7																						
	4		8	8	5																						
	5		8	8	7																						
37	1		8	8	6			25.4	25.4 27.3	24.13			7.8	7.8 7.7	7.14			6.4	6.8 5.8	7.7			318	318 180.3	251		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	7																						
	5		8	8	7																						
Chemistry Tech prerenewal/postrenewal								mv EDC	GM	GM			mv EDC	GM	GM			mv EDC	GM	GM			mv EDC	GM	GM		

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.0)

Project# X16643

Client Camden

Sample Description CO2

Test started: Date 3/28/18 Time 1455

Test ended: Date 3/30/18 Time 1400

Test Species D. pulex ID# BRA31-B30

Technician: 0hour EM 24hour EW 48hour EM 72hour _____ 96hour _____

Time: 0hour 1455 24hour 1511 48hour 1400 72hour _____ 96hour _____

Temperature (°C): 0hour 25.8 24hour 25.6 48hour 25.8 72hour _____ 96hour _____

Test Dilution %	Rep.	Test Salinity ppt	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
SOFT V	1	1	8	8	8			24.4	24.7	24.5			7.2	7.5	7.7			8.0	7.2	7.2			217	206	203		
	2		8	8	8				/					/					/					/				
	3		8	8	8				/					/					/					/				
	4		8	8	8				/					/					/					/				
	5		8	8	8				/					/					/					/				
									/					/					/					/				
									/					/					/					/				
									/					/					/					/				
									/					/					/					/				
									/					/					/					/				
Chemistry Tech prerenewal/postrenewal								EW EM					MV	EW EM				MV	EW EM				MV	EW EM			

X66643

Test: DA-Daphnid Acute Test							Test ID: CAMDP		
Species: DP-Daphnia pulex							Protocol: EPAAW02-EPA/821/R-02-012		
Sample ID: AR0022365							Sample Type: EFF2-Industrial		
Start Date:		End Date:					Lab ID: ADEQ880630		
Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
1	20	5	21						
2	13	3	16						
3	16	1	21						
4	2	2	D-Control						
5	30	5	37						
6	1	1	D-Control						
7	25	5	28						
8	14	4	16						
9	26	1	37						
10	24	4	28						
11	6	1	12						
12	19	4	21						
13	12	2	16						
14	5	5	D-Control						
15	8	3	12						
16	29	4	37						
17	18	3	21						
18	7	2	12						
19	10	5	12						
20	15	5	16						
21	11	1	16						
22	27	2	37						
23	9	4	12						
24	17	2	21						
25	3	3	D-Control						
26	4	4	D-Control						
27	23	3	28						
28	22	2	28						
29	21	1	28						
30	28	3	37						

Comments:

Reviewed by: 3/26/18

Test: DA-Daphnid Acute Test							Test ID: X6643DP		
Species: DP-Daphnia pulex							Protocol: EPAAW02-EPA/821/R-02-012		
Sample ID: AR0022365/002							Sample Type: EFF2-Industrial		
Start Date: 3/28/2018			End Date: 3/30/2018				Lab ID: ADEQ880630		
Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	D-Control	8	8	6			
	2	2	D-Control	8	7	7			
	3	3	D-Control	8	5	1			
	4	4	D-Control	8	5	4			
	5	5	D-Control	8	8	8			
	6	1	12	8	8	6			
	7	2	12	8	8	5			
	8	3	12	8	8	8			
	9	4	12	8	8	7			
	10	5	12	8	8	7			
	11	1	16	8	8	7			
	12	2	16	8	8	7			
	13	3	16	8	8	8			
	14	4	16	8	8	8			
	15	5	16	8	8	8			
	16	1	21	8	8	3			
	17	2	21	8	7	7			
	18	3	21	8	8	8			
	19	4	21	8	8	7			
	20	5	21	8	8	8			
	21	1	28	8	8	5			
	22	2	28	8	8	8			
	23	3	28	8	8	7			
	24	4	28	8	8	5			
	25	5	28	8	8	7			
	26	1	37	8	8	6			
	27	2	37	8	8	8			
	28	3	37	8	8	8			
	29	4	37	8	8	7			
	30	5	37	8	8	7			
	31	1	SOFT CHECK	8	8	8			
	32	2	SOFT CHECK	8	8	8			
	33	3	SOFT CHECK	8	8	8			
	34	4	SOFT CHECK	8	8	8			
	35	5	SOFT CHECK	8	8	8			

Comments:

Reviewed by: EDK 4/4/18
VBB 4/24/18

Daphnid Acute Test-48 Hr Survival

Start Date:	3/28/2018	Test ID:	X6643DP	Sample ID:	AR0022365/002
End Date:	3/30/2018	Lab ID:	ADEQ880630	Sample Type:	EFF2-Industrial
Sample Date:	3/28/2018	Protocol:	EPAAW02-EPA/821/R-02-01	Test Species:	DP-Daphnia pulex

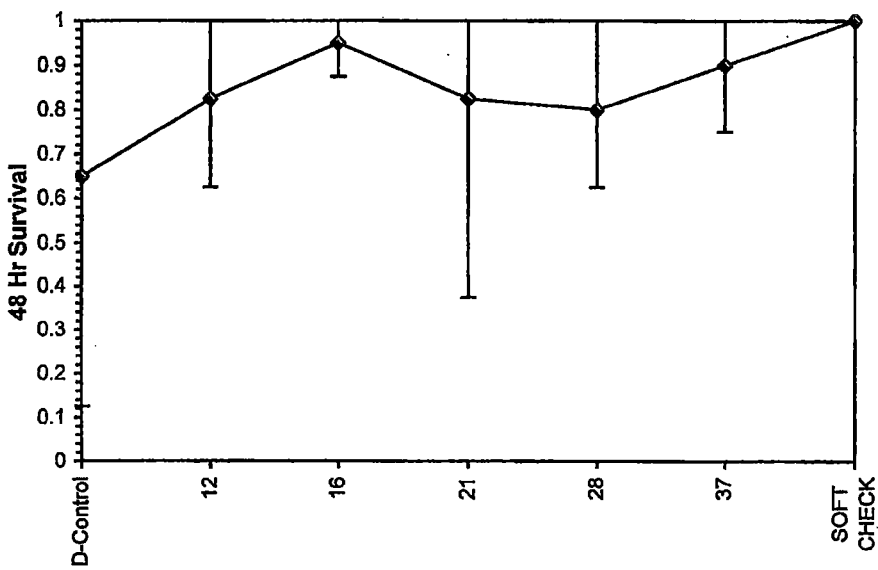
Comments:

Conc-%	1	2	3	4	5
D-Control	0.7500	0.8750	0.1250	0.5000	1.0000
12	0.7500	0.6250	1.0000	0.8750	0.8750
16	0.8750	0.8750	1.0000	1.0000	1.0000
21	0.3750	0.8750	1.0000	0.8750	1.0000
28	0.6250	1.0000	0.8750	0.6250	0.8750
37	0.7500	1.0000	1.0000	0.8750	0.8750
SOFT CHECK	1.0000	1.0000	1.0000	1.0000	1.0000

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
D-Control	0.6500	1.0000	0.9593	0.3614	1.3931	41.900	5		
12	0.8250	1.2692	1.1542	0.9117	1.3931	15.823	5	31.00	16.00
16	0.9500	1.4615	1.3196	1.2094	1.3931	7.623	5	35.50	16.00
21	0.8250	1.2692	1.1728	0.6591	1.3931	25.709	5	32.00	16.00
28	0.8000	1.2308	1.1271	0.9117	1.3931	18.667	5	30.50	16.00
37	0.9000	1.3846	1.2504	1.0472	1.3931	11.683	5	33.50	16.00
SOFT CHECK	1.0000	1.5385	1.3931	1.3931	1.3931	0.000	5	37.50	16.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.94035	0.934	-0.8568	1.79166
Equality of variance cannot be confirmed				
Hypothesis Test (1-tail, 0.05)				
Steel's Many-One Rank Test indicates no significant differences				
Treatments vs D-Control				

Dose-Response Plot



Invalid
Control < 90%

EOR 4/4/18

ToxCalc v5.0.23

Reviewed by: 4/4/18 EOR 4/4/18

APPENDIX D
STATISTICAL ANALYSES

Test: AC-Acute Fish Test							Test ID: X6643PP		
Species: PP-Pimephales promelas							Protocol: EPAAW02-EPA/821/R-02-012		
Sample ID: AR0022365/002							Sample Type: EFF2-Industrial		
Start Date: 3/28/2018			End Date: 3/30/2018				Lab ID: ADEQ880630		
Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	D-Control	8	8	8			
	2	2	D-Control	8	8	8			
	3	3	D-Control	8	8	8			
	4	4	D-Control	8	8	8			
	5	5	D-Control	8	8	8			
	6	1	12	8	8	7			
	7	2	12	8	8	7			
	8	3	12	8	8	8			
	9	4	12	8	8	8			
	10	5	12	8	8	8			
	11	1	16	8	8	8			
	12	2	16	8	8	8			
	13	3	16	8	8	8			
	14	4	16	8	8	8			
	15	5	16	8	8	8			
	16	1	21	8	8	8			
	17	2	21	8	8	8			
	18	3	21	8	8	8			
	19	4	21	8	8	8			
	20	5	21	8	8	8			
	21	1	28	8	8	8			
	22	2	28	8	8	8			
	23	3	28	8	8	8			
	24	4	28	8	8	8			
	25	5	28	8	8	8			
	26	1	37	8	8	8			
	27	2	37	8	7	7			
	28	3	37	8	8	8			
	29	4	37	8	8	8			
	30	5	37	8	8	8			
	31	1	SOFT CHECK	8	8	8			
	32	2	SOFT CHECK	8	8	8			
	33	3	SOFT CHECK	8	8	8			
	34	4	SOFT CHECK	8	8	8			
	35	5	SOFT CHECK	8	8	8			

Comments:

ToxCalc 5.0

Reviewed by: BDK 4/4/18 ✓ BDK 4/24/18

Acute Fish Test-48 Hr Survival

Start Date:	3/28/2018	Test ID:	X6643PP	Sample ID:	AR0022365/002
End Date:	3/30/2018	Lab ID:	ADEQ880630	Sample Type:	EFF2-Industrial
Sample Date:	3/28/2018	Protocol:	EPAAW02-EPA/821/R-02-01	Test Species:	PP-Pimephales promelas

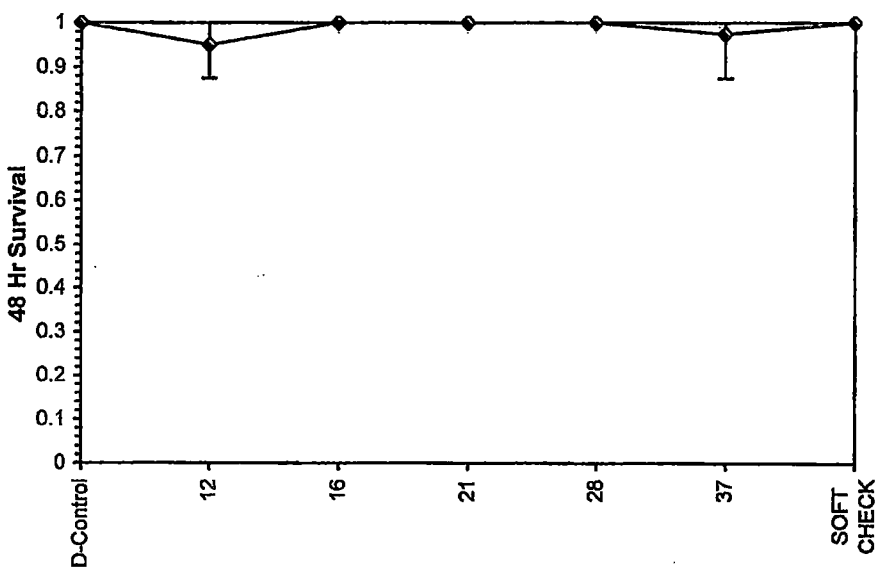
Comments:

Conc-%	1	2	3	4	5
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000
12	0.8750	0.8750	1.0000	1.0000	1.0000
16	1.0000	1.0000	1.0000	1.0000	1.0000
21	1.0000	1.0000	1.0000	1.0000	1.0000
28	1.0000	1.0000	1.0000	1.0000	1.0000
37	1.0000	0.8750	1.0000	1.0000	1.0000
SOFT CHECK	1.0000	1.0000	1.0000	1.0000	1.0000

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
D-Control	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5		
12	0.9500	0.9500	1.3196	1.2094	1.3931	7.623	5	22.50	16.00
16	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5	27.50	16.00
21	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5	27.50	16.00
28	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5	27.50	16.00
37	0.9750	0.9750	1.3564	1.2094	1.3931	6.055	5	25.00	16.00
SOFT CHECK	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5	27.50	16.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.67398	0.934	-1.5743	4.34273
Equality of variance cannot be confirmed				
Hypothesis Test (1-tail, 0.05)				
Steel's Many-One Rank Test indicates no significant differences				
Treatments vs D-Control				

Dose-Response Plot



Reviewed by: EPW 4/4/18
✓EBB 4/24/18

Test: DA-Daphnid Acute Test							Test ID: X6643DPV		
Species: DP-Daphnia pulex							Protocol: EPAAW02-EPA/821/R-02-012		
Sample ID: AR0022365							Sample Type: EFF1-POTW		
Start Date: 4/18/2018			End Date: 4/20/2018				Lab ID: ADEQ880630		
Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	D-Control	8	8	8			
	2	2	D-Control	8	8	8			
	3	3	D-Control	8	8	8			
	4	4	D-Control	8	8	8			
	5	5	D-Control	8	7	7			
	6	1	12	8	8	8			
	7	2	12	8	8	7			
	8	3	12	8	8	8			
	9	4	12	8	6	6			
	10	5	12	8	8	7			
	11	1	16	8	8	8			
	12	2	16	8	8	8			
	13	3	16	8	8	8			
	14	4	16	8	8	7			
	15	5	16	8	8	8			
	16	1	21	8	8	7			
	17	2	21	8	7	6			
	18	3	21	8	8	8			
	19	4	21	8	8	8			
	20	5	21	8	8	8			
	21	1	28	8	7	6			
	22	2	28	8	7	7			
	23	3	28	8	8	8			
	24	4	28	8	8	8			
	25	5	28	8	8	7			
	26	1	37	8	8	6			
	27	2	37	8	8	7			
	28	3	37	8	7	7			
	29	4	37	8	8	8			
	30	5	37	8	8	8			

Comments:

Reviewed by: EVB 4/24/18

Daphnid Acute Test-48 Hr Survival

Start Date:	4/18/2018	Test ID:	X6643DPV	Sample ID:	AR0022365
End Date:	4/20/2018	Lab ID:	ADEQ880630	Sample Type:	EFF1-POTW
Sample Date:	4/17/2018	Protocol:	EPAAW02-EPA/821/R-02-01	Test Species:	DP-Daphnia pulex

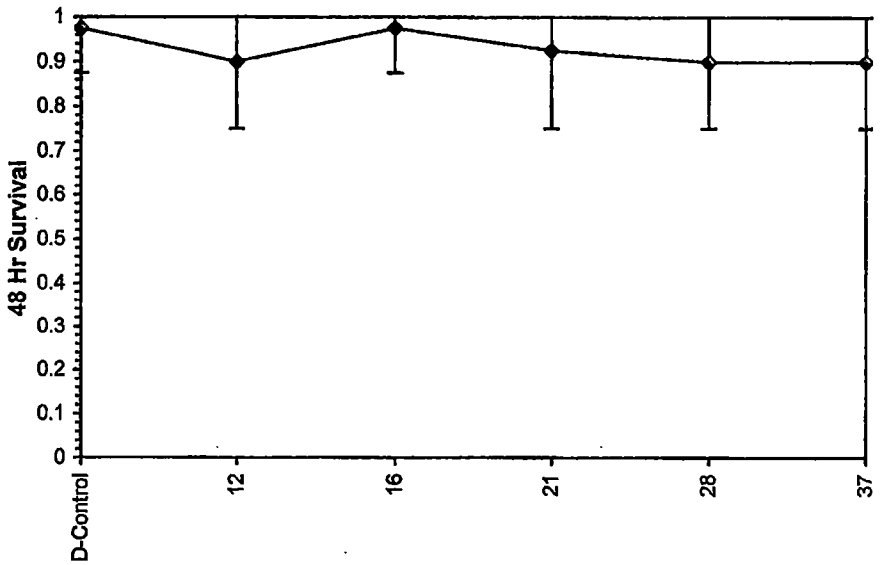
Comments:

Conc-%	1	2	3	4	5
D-Control	1.0000	1.0000	1.0000	1.0000	0.8750
12	1.0000	0.8750	1.0000	0.7500	0.8750
16	1.0000	1.0000	1.0000	0.8750	1.0000
21	0.8750	0.7500	1.0000	1.0000	1.0000
28	0.7500	0.8750	1.0000	1.0000	0.8750
37	0.7500	0.8750	0.8750	1.0000	1.0000

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
D-Control	0.9750	1.0000	1.3564	1.2094	1.3931	6.055	5		
12	0.9000	0.9231	1.2504	1.0472	1.3931	11.683	5	22.00	16.00
16	0.9750	1.0000	1.3564	1.2094	1.3931	6.055	5	27.50	16.00
21	0.9250	0.9487	1.2872	1.0472	1.3931	12.116	5	24.50	16.00
28	0.9000	0.9231	1.2504	1.0472	1.3931	11.683	5	22.00	16.00
37	0.9000	0.9231	1.2504	1.0472	1.3931	11.683	5	22.00	16.00

Auxiliary Tests				Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)				0.89748	0.927	-0.5518	-0.6935
Bartlett's Test indicates equal variances (p = 0.71)				2.91111	15.0863		
Hypothesis Test (1-tail, 0.05)	**NOEC**	**LOEC**	**ChV**	**TU**			
Steel's Many-One Rank Test	37	>37		2.7027			
Treatments vs D-Control							

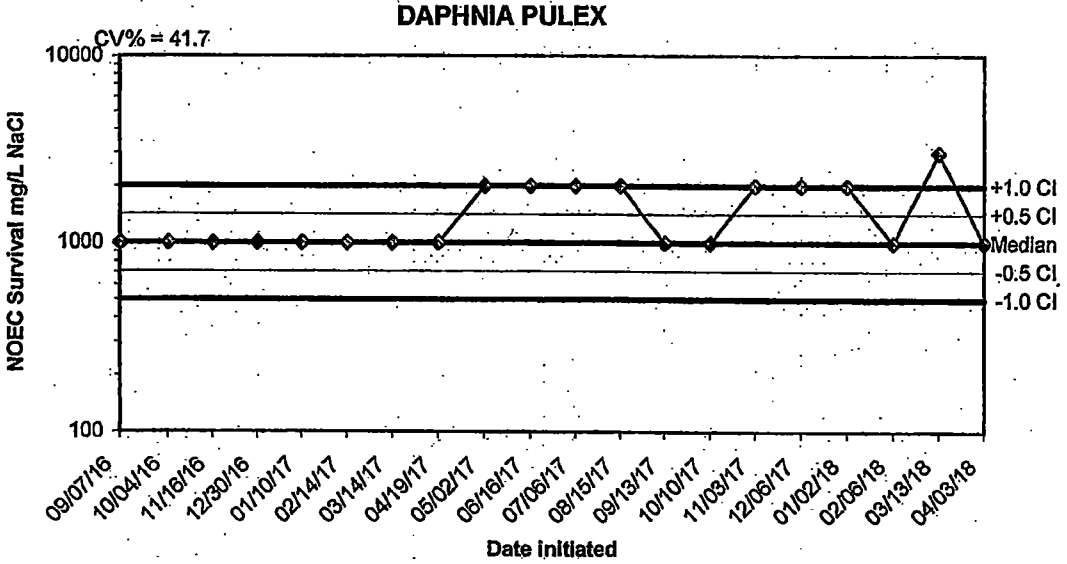
Dose-Response Plot



Reviewed by: EB 4/24/18

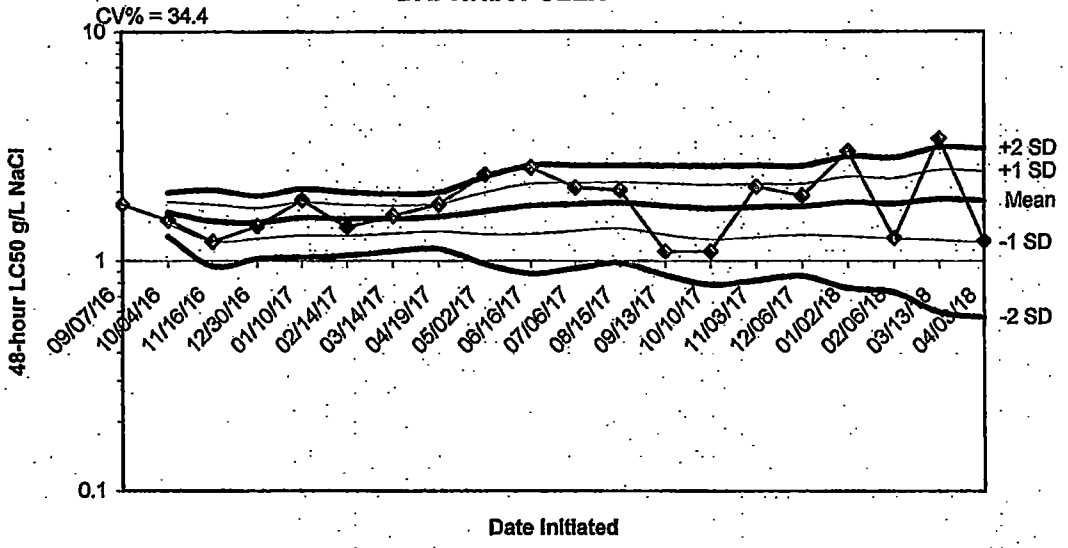
APPENDIX E
QUALITY ASSURANCE CHARTS

2018 48-HOUR ACUTE REFERENCE TOXICANT TEST RESULTS FOR DAPHNIA PULEX



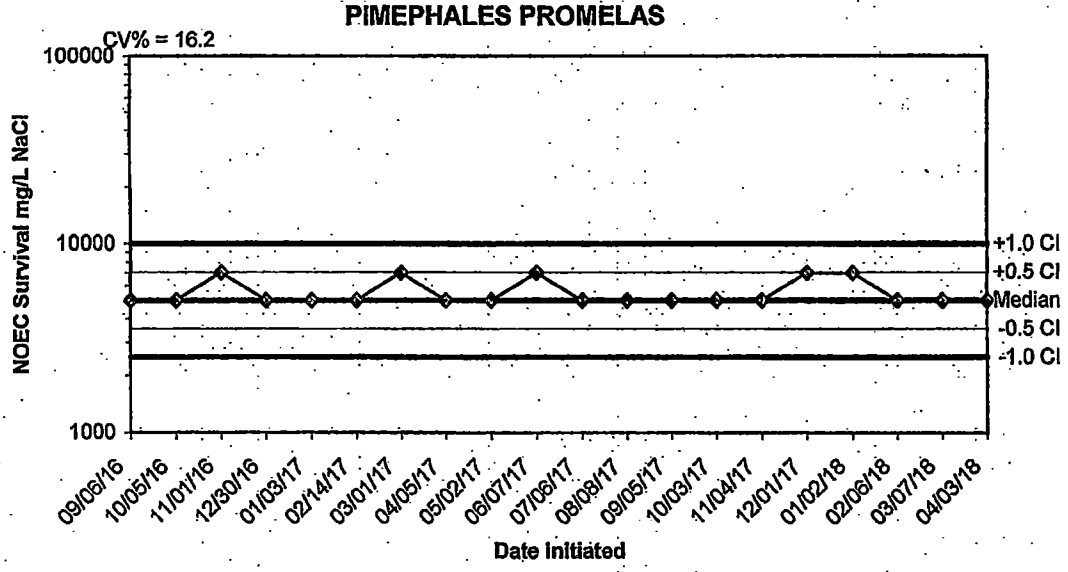
Dates	Values	Median	-0.5 CI	-1.0 CI	+0.5 CI	+1.0 CI
09/07/16	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
10/04/16	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
11/16/16	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
12/30/16	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
01/10/17	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
02/14/17	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
03/14/17	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
04/19/17	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
05/02/17	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
06/16/17	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
07/06/17	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
08/15/17	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
09/13/17	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
10/10/17	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
11/03/17	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
12/06/17	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
01/02/18	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
02/06/18	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
03/13/18	3000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
04/03/18	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000

2018 48-HOUR ACUTE REFERENCE TOXICANT TEST RESULTS FOR DAPHNIA PULEX



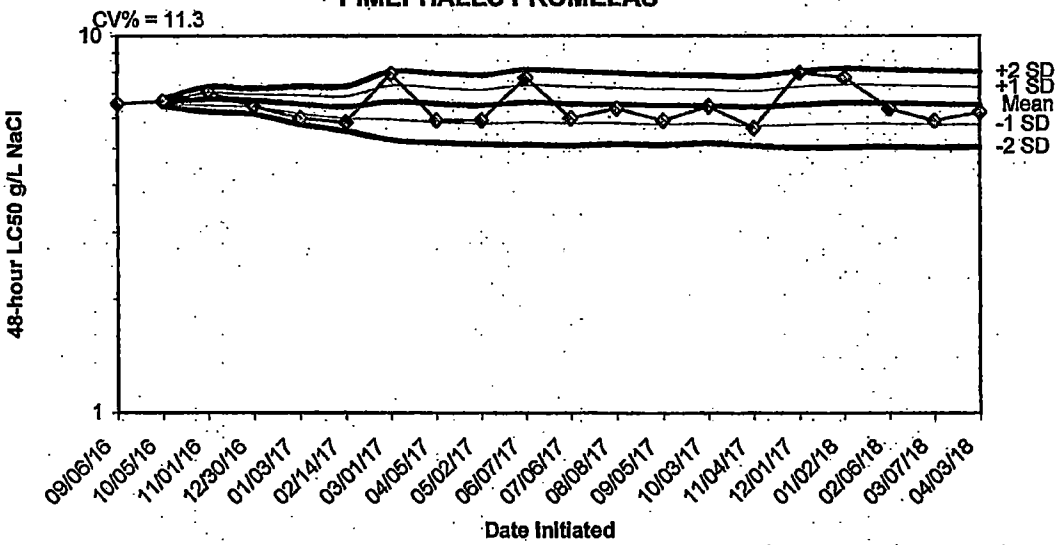
Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
09/07/16	1.7500					
10/04/16	1.5000	1.6250	1.4482	1.2714	1.8018	1.9786
11/16/16	1.2100	1.4867	1.2164	0.9462	1.7569	2.0272
12/30/16	1.4100	1.4675	1.2435	1.0196	1.6915	1.9154
01/10/17	1.8300	1.5400	1.2872	1.0344	1.7928	2.0456
02/14/17	1.4000	1.5167	1.2835	1.0502	1.7499	1.9831
03/14/17	1.5700	1.5243	1.3104	1.0966	1.7381	1.9520
04/19/17	1.7569	1.5534	1.3390	1.1246	1.7677	1.9821
05/02/17	2.3750	1.6447	1.3052	0.9658	1.9841	2.3236
06/16/17	2.5400	1.7342	1.3069	0.8796	2.1615	2.5888
07/06/17	2.0800	1.7656	1.3471	0.9285	2.1842	2.6028
08/15/17	2.0300	1.7877	1.3813	0.9750	2.1940	2.6003
09/13/17	1.1000	1.7348	1.3015	0.8682	2.1680	2.6013
10/10/17	1.0991	1.6894	1.2398	0.7902	2.1390	2.5885
11/03/17	2.1100	1.7174	1.2708	0.8241	2.1640	2.6107
12/06/17	1.9200	1.7301	1.2956	0.8611	2.1645	2.5990
01/02/18	3.0000	1.8048	1.2834	0.7620	2.3261	2.8475
02/06/18	1.2600	1.7745	1.2527	0.7308	2.2963	2.8182
03/13/18	3.4000	1.8601	1.2306	0.6011	2.4895	3.1190
04/03/18	1.2200	1.8281	1.1989	0.5697	2.4572	3.0864

2018 48-HOUR ACUTE REFERENCE TOXICANT TEST RESULTS FOR PIMEPHALES PROMELAS



Dates	Values	Median	-0.5 CI	-1.0 CI	+0.5 CI	+1.0 CI
09/06/16	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
10/05/16	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
11/01/16	7000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
12/30/16	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
01/03/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
02/14/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
03/01/17	7000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
04/05/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
05/02/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
06/07/17	7000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
07/06/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
08/08/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
09/05/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
10/03/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
11/04/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
12/01/17	7000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
01/02/18	7000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
02/06/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
03/07/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
04/03/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000

2018 48-HOUR ACUTE REFERENCE TOXICANT TEST RESULTS FOR PIMEPHALES PROMELAS



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
09/06/16	6.5600					
10/05/16	6.6700	6.6150	6.5372	6.4594	6.6928	6.7706
11/01/16	7.0600	6.7633	6.5006	6.2378	7.0261	7.2888
12/30/16	6.4600	6.6875	6.4248	6.1620	6.9502	7.2130
01/03/17	6.0100	6.5520	6.1731	5.7942	6.9309	7.3098
02/14/17	5.8600	6.4367	5.9955	5.5542	6.8779	7.3191
03/01/17	7.9200	6.6486	5.9582	5.2679	7.3389	8.0292
04/05/17	5.9200	6.5575	5.8684	5.1794	7.2466	7.9356
05/02/17	5.9200	6.4867	5.8080	5.1293	7.1654	7.8441
06/07/17	7.7100	6.6090	5.8613	5.1135	7.3567	8.1045
07/06/17	6.0000	6.5536	5.8209	5.0882	7.2864	8.0191
08/08/17	6.3700	6.5383	5.8377	5.1370	7.2390	7.9396
09/05/17	5.9200	6.4908	5.7984	5.1060	7.1832	7.8756
10/03/17	6.4600	6.4886	5.8233	5.1580	7.1539	7.8191
11/04/17	5.6700	6.4340	5.7590	5.0840	7.1090	7.7840
12/01/17	7.9400	6.5281	5.7751	5.0221	7.2811	8.0342
01/02/18	7.7100	6.5976	5.8142	5.0308	7.3811	8.1645
02/06/18	6.3700	6.5850	5.8231	5.0611	7.3469	8.1089
03/07/18	5.9200	6.5500	5.7940	5.0380	7.3060	8.0620
04/03/18	6.2400	6.5345	5.7954	5.0563	7.2736	8.0127

APPENDIX F
AGENCY FORMS

Acute Forms
Pimephales promelas Survival

Permittee: Camden Water Utilities
NPDES Permit Number: AR0022365/AFIN 52-00073
Composite Collected From: 3/26/18 To: 3/27/18
From: 3/27/18 To: 3/28/18
Test Initiated: 3/28/18
Dilution Water Used: X Receiving Water Reconstituted Water

Dilution Series Results - Percent Survival

TIME OF READING	REP	0	12.0	16.0	21.0	28.0	37.0
24-hour	A	100.0	100.0	100.0	100.0	100.0	100.0
	B	100.0	100.0	100.0	100.0	100.0	87.5
	C	100.0	100.0	100.0	100.0	100.0	100.0
	D	100.0	100.0	100.0	100.0	100.0	100.0
	E	100.0	100.0	100.0	100.0	100.0	100.0
48-hour	A	100.0	87.5	100.0	100.0	100.0	100.0
	B	100.0	87.5	100.0	100.0	100.0	87.5
	C	100.0	100.0	100.0	100.0	100.0	100.0
	D	100.0	100.0	100.0	100.0	100.0	100.0
	E	100.0	100.0	100.0	100.0	100.0	100.0
	Mean	100.0	95.0	100.0	100.0	100.0	97.5

1. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate: Is the mean survival at 48 hours significantly different (p=.05) than the control survival for the % effluent corresponding to:
a.) LOW FLOW OR CRITICAL DILUTION (28.0%) YES X NO
b.)½ LOW FLOW OR 2X CRITICAL DILUTION (N/A%) YES NO
2. Enter percent effluent corresponding to the LC_{50} below:
LC_{50} = >37.0% effluent
95 % confidence limits: N/A
Method of LC_{50} calculation: N/A
3. If you answered NO to 1.a) enter (P) otherwise enter (F): P
4. Enter response to item 3 on DMR Form, parameter TEM3D
5. If you answered NO to 1.b) enter (P) otherwise enter (F): N/A
6. Enter response to item 5 on DMR Form, parameter TFM3D

Biomonitoring
Pimephales promelas 48 hour Acute Static Renewal
Chemical Parameters Chart*

Permittee: Camden Water Utilities
NPDES Number: AR0022365/AFIN 52-00073
Contact: Keith Ballard
Analyst: Ware, Valle

Sample Collected	**From:**	**Date 3/26/18**	**Time 0800**
	To:	**Date 3/27/18**	**Time 0800**
Test Begin		**Date 3/28/18**	**Time 1500**
Test End		**Date 3/30/18**	**Time 1405**

Parameter	D.O.			Temperature			Alkalinity			Hardness			pH		
Dilut./Time	0hrs.	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs
0.0	7.5	7.6	7.6	25.0	25.3	25.0	12.0			24.0			6.7	6.3	7.1
12.0	7.5	7.6	7.5	25.0	25.3	25.0							6.6	6.1	6.9
16.0	7.7	7.6	7.5	25.0	25.3	25.0							6.2	6.0	6.9
21.0	7.7	7.7	6.9	25.0	25.3	25.0							6.1	5.9	7.8
28.0	7.7	7.6	7.6	25.0	25.3	25.0							6.5	5.9	6.8
37.0	7.8	7.7	7.5	25.0	25.3	25.0	20.0	21.0		36.0	84.0		6.6	5.8	6.8

*This Form is to be submitted with each DMR.
Alkalinity and hardness to be reported as mg/l $CaCO_3$ on 100% effluent.

Acute Forms
Daphnia pulex Survival

Permittee: Camden Water Utilities
NPDES Permit Number: AR0022365/AFIN 52-00073
Composite Collected **From: 4/16/18** **To: 4/17/18**
From: 4/17/18 **To: 4/18/18**
Test Initiated: 4/18/18
Dilution Water Used: **Receiving Water** **X Reconstituted Water**

Dilution Series Results - Percent Survival

TIME OF READING	REP	0	12.0	16.0	21.0	28.0	37.0
24-hour	A	100.0	100.0	100.0	100.0	87.5	100.0
	B	100.0	100.0	100.0	87.5	87.5	100.0
	C	100.0	100.0	100.0	100.0	100.0	87.5
	D	100.0	75.0	100.0	100.0	100.0	100.0
	E	87.5	100.0	100.0	100.0	100.0	100.0
48-hour	A	100.0	100.0	100.0	87.5	75.0	75.0
	B	100.0	87.5	100.0	75.0	87.5	87.5
	C	100.0	100.0	100.0	100.0	100.0	87.5
	D	100.0	75.0	87.5	100.0	100.0	100.0
	E	87.5	87.5	100.0	100.0	87.5	100.0
	Mean	97.5	90.0	97.5	92.5	90.0	90.0

1. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate: Is the mean survival at 48 hours significantly different (p=.05) than the control survival for the % effluent corresponding to:
a.) LOW FLOW OR CRITICAL DILUTION (28.0%) **YES** **X** **NO**
b.)½ LOW FLOW OR 2X CRITICAL DILUTION (N/A%) **YES** **NO**
2. Enter percent effluent corresponding to the LC_{50} below:
LC_{50} = >37.0% effluent
95 % confidence limits: N/A
Method of LC_{50} calculation: N/A
3. If you answered NO to 1.a) enter (P) otherwise enter (F): P
4. Enter response to item 3 on DMR Form, parameter TEM3D
5. If you answered NO to 1.b) enter (P) otherwise enter (F): N/A
6. Enter response to item 5 on DMR Form, parameter TFM3D

Biomonitoring
Daphnia pulex 48 hour Acute Static Renewal
Chemical Parameters Chart*

Permittee: Camden Water Utilities
NPDES Number: AR0022365/AFIN 52-00073
Contact: Keith Ballard
Analyst: Morado, Valle
Sample Collected **From:** **Date 4/16/18** **Time 0800**
To: **Date 4/17/18** **Time 0800**
Test Begin **Date 4/18/18** **Time 1400**
Test End **Date 4/20/18** **Time 1340**

Parameter	D.O.			Temperature			Alkalinity			Hardness			pH		
Dilut./Time	0hrs.	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs
0.0	8.0	7.8	8.6	25.1	25.5	25.2	24.0			44.0			7.5	7.6	7.5
12.0	7.9	7.8	8.5	25.1	25.5	25.2							7.5	7.4	7.5
16.0	7.9	7.8	8.4	25.1	25.5	25.2							7.3	7.2	7.5
21.0	7.9	7.8	8.3	25.1	25.5	25.2							7.3	7.2	7.4
28.0	7.8	7.8	8.3	25.1	25.5	25.2							7.2	7.2	7.4
37.0	7.8	7.8	8.2	25.1	25.5	25.2	24.0	20.0		28.0	40.0		7.2	7.1	7.4

*This Form is to be submitted with each DMR.
Alkalinity and hardness to be reported as mg/l $CaCO_3$ on 100% effluent.

APPENDIX G
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: Camden Water Utilities

Project#: X66643

Chain of Custody Documents Checked by: Emily Moore 4/25/18
Technician/Date

Raw Data Documents Checked by: Emily Moore 4/25/18
Technician/Date

Statistical Analysis Package Checked by: EGB 4/24/18
Quality Manager/Date

Quality Control Data Checked by: EGB 3/19/18
Quality Manager/Date

Report Checked by: EGB 4/26/18
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.

Erin L. Briggs, BS — 4/26/18
Quality Manager — Date

Report Rev. 3.0

Bio-Analytical Laboratories (BAL)
ADEQ #880630
Project X6707

Bio-Analytical Laboratories' Executive Summary

Permittee: Camden Water Utilities
P.O. Box J
Camden, AR 71711
Project #: X6707
Outfall: 002 (treated sanitary wastewater)
Permit #: AR0022365/ AFIN 52-00073
Contact: Mr. Keith Ballard
Test Dates: May 31 - June 2, 2018
Test Type: 48-hour Acute Definitive Toxicity Test using *Pimephales promelas*- (EPA Method 2000.0)
48-hour Acute Definitive Toxicity Test using *Daphnia pulex* (EPA Method 2021.0)

Results:

For *Daphnia pulex:*
1. If the NOEC for survival is less than the critical dilution (28.0%), enter a "1"; otherwise, enter a "0" for Parameter No. TEM3D - 0 **(Pass).**
2. Report the NOEC value for survival, Parameter No. TOM3D - 37.0%.
3. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQM3D- 0.00%.

For *Pimephales promelas:*
1. If the NOEC for survival is less than the critical dilution (28.0%), enter a "1"; otherwise, enter a "0" for Parameter No. TEM6C - 0 **(Pass).**
2. Report the NOEC value for survival, Parameter No. TOM6C - 37.0%.
3. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQM6C - 12.12%.

This report contains a total of 36 pages, including this page. The information within pertains only to the samples listed in the chain of custody documents. The results comply with the 2009 TNI standard. The chemical data recorded in this report are for monitoring purposes only and should not be reported on discharge monitoring reports.

Bio-Analytical Laboratories

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THE RESULTS OF TWO 48-HOUR ACUTE DEFINITIVE TOXICITY TESTS FOR OUTFALL 002 AT

CAMDEN WATER UTILITIES
Camden, Arkansas

NPDES #AR0022365
AFIN #52-00073

EPA Methods 2000.0 and 2021.0

Project X6707

Test Dates: May 31 - June 2, 2018

Report Date: June 12, 2018

Prepared for:
Mr. Keith Ballard
Camden Water Utilities
P.O. Box J
Camden, AR 71711

Prepared by:
Ginger Briggs
Bio-Analytical Laboratories
P.O. Box 527
Doyline, LA 71023
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BAL
ADEQ #880630
Project X6707

TABLE OF CONTENTS

1.0 Introduction	4
2.0 Methods and Materials	4
2.1 Test Methods	4
2.2 Test Organisms	4
2.3 Dilution Water	4
2.4 Test Concentrations	5
2.5 Sample Collection	5
2.6 Sample Preparation	5
2.7 Monitoring of the Tests	5
2.8 Data Analysis	5
3.0 Results and Discussion	6
4.0 Conclusions	7
5.0 References	8
Appendices	
A- Chain-of-Custody Documents	9
B- Raw Data Sheets	11
C- Statistical Analyses	21
D- Quality Assurance Charts	26
E - Agency Forms	30
F- Report Quality Assurance Form	35

BAL
ADEQ #880630
Project X6707

1.0 Introduction

Bio-Analytical Laboratories (BAL), Doyline, Louisiana conducted two 48-hour acute definitive toxicity tests for Outfall 002 at the wastewater treatment plant operated by Camden Water Utilities, Camden, Arkansas . Such testing will determine compliance with the Water Quality Standard, of greater than 50 percent survival of the appropriate test organism in the defined low-flow effluent concentration (critical dilution) for a 48-hour period. The test organisms used were the cladoceran, *Daphnia pulex* and the fathead minnow, *Pimephales promelas.* The test endpoints are the No-Observed-Effect-Concentration (NOEC), which is defined as the highest effluent concentration that is not statistically different from the control, and the Lethal Concentration (LC_{50}), which is the effluent concentration at which 50 percent of the test organisms die.

2.0 Methods and Materials

2.1 Test Methods

All methods followed were according to the latest edition of "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms" (EPA-821-R-02-012), "Standard Methods (SM) for The Examination of Water and Wastewater. 20th Edition" (APHA 1998. Each chemical method listed in the report as SM 1997) and BAL's standard operating procedure.

2.2 Test Organisms

The *Daphnia pulex* test organisms were cultured in-house at test temperature and were less than 24 hours old at test initiation. The fathead minnows were obtained from Environmental Consulting and Testing, Superior, Wisconsin, and were approximately 3 days old at test initiation. The minnows were acclimated to test temperature and dilution water hardness prior to testing. Forty-eight hour reference toxicant tests were conducted a minimum of once monthly in order to document organism sensitivity.

2.3 Dilution Water

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

BAL
ADEQ #880630
Project X6707

2.4 Test Concentrations

The test concentrations used in the acute toxicity tests were 37.0, 28.0, 21.0, 16.0 and 12.0 percent effluent and a control. The critical dilution was defined as 28.0 percent effluent. The tests were conducted using 5 replicates of 8 animals each for a total of 40 animals per concentration.

2.5 Sample Collection

Two 24-hour composite samples of Outfall 002 were collected by Camden Water Utilities personnel on May 30 and 31, 2018, at 0800 hours. Upon completion of collection, the samples were packed in ice and delivered to Bio-Analytical Laboratories by BAL personnel. The temperature upon arrival of each set of samples was 0.9^0 Celsius, respectively.

2.6 Sample Preparation

Upon arrival, the samples were logged in, given an identification number and refrigerated unless needed. Prior to use, each sample was warmed to 25 ± 1^0 Celsius. Total residual chlorine levels (SM 4500-Cl E) were measured in milligrams/Liter (mg/L) with a Capital Controls^R amperometric titrator and recorded if present. Total ammonia levels were measured in mg/L using a test strip. Dissolved oxygen (SM 4500-O G), pH (SM 4500-H+ B) and conductivity (SM 2510 B) measurements, in mg/L, standard units and umhos/cm, respectively, were taken on the control and each test concentration at test initiation, at test renewal and at test termination. Alkalinity (SM 2320B) and hardness (SM 2340 C) levels were measured in mg/L as $CaCO_3$ on the control and the highest effluent concentration.

2.7 Monitoring of the Tests

The tests were run in a Precision^R dual programmable illuminated incubator set at a temperature of 25 ± 1^0 Celsius. An AEMC^R data logger was used to monitor diurnal temperature throughout the testing period. Light cycle and intensity were recorded twice a month.

2.8 Data Analysis

Survival data was analyzed using the ToxCalc v5.0.23 statistical program to obtain the No- Observed- Effect- Concentration (NOEC) values. The LC_{50} values were also obtained using the ToxCalc program.

BAL
ADEQ #880630
Project X6707

3.0 Results and Discussion

The results of the definitive tests can be found in Table 1. The mean survival in the 28.0 percent critical dilution was greater than 50 percent after 48 hours of exposure in both tests. The NOEC value for the *Daphnia pulex* and the fathead minnow test was 37.0 percent effluent (p.= .05). The 48-hour LC_{50} value for the *Daphnia pulex* and fathead minnow test was >37.0 percent effluent (p=.05).

Table 1: Results of the 48-hour Acute Definitive Toxicity Tests

Percent Effluent	Percent Survival	
Test Organism	*D. pulex*	*P.promelas*
Control	100.0	92.5
12.0	97.5	100.0
16.0	92.5	100.0
21.0	100.0	97.5
28.0	100.0	100.0
37.0	97.5	97.5

The 48-hour reference toxicant test results indicate that the test organisms were within the respective sensitivity range. The graphs of the results of the acute reference toxicant tests can be found in Appendix D- Quality Assurance Charts.

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Project X6707

4.0 Conclusions

The two composite samples of Outfall 002 collected from Camden Water Utilities' wastewater treatment plant on May 30 and 31, 2018, were not found to be lethally toxic to the *Daphnia pulex* test organisms nor the *Pimephales promelas* test organisms in the 28.0 percent critical dilution after 48 hours of exposure (p=.05).

BAL
ADEQ #880630
Project X6707

5.0 References

EPA, 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. EPA-821-R-02-012, 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
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NELAP/LELAP 01975, ADEQ 88-0630, TCEQ T104704278

Laboratory Use Only:

Company: Camden Water Utilities	Phone: (870) 836-4329	Analysis:								
Address: P.O. Box J, Camden, AR 71711	Fax: (870) 836-5190	Chronic Ceriodaphnia	Chronic minnow	Acute minnow(fresh/marine)	Acute Daphnia species	Acute Mysid	Acute Ceriodaphnia	Fecal Coliform	Lab Control Number:	Project Number: ~~X6708~~ X6707 e-cam 5/31/18
Permit #: AR0022365/ AFIN 52-00073	Purchase Order:									Temp. upon arrival: 0.9
Sampler's Signature/Printed Name/Affiliation: Annette Strickland / Annette Strickland										Therm#: 24
										Color: brownish
										Odor: none
										Tech: LCM
										Preservative: (below)

Date Start / Date End	Time Start / Time End	C	G	# and type of container	Sample Identification									
5-29-18 / 5-30-18	8:00 Am / 8:00 Am	X		2 half gallons	002- Day 1			X	X				C15370	ICE
5-30-18 / 5-31-18	8:00 Am / 8:00 Am	X		2 half gallons	002- Day 2			X	X				C15371	

Relinquished by/Affiliation:	Date:	Time:	Received by/Affiliation:	Date:	Time:
Mike Langley	5-31-18	9:20a		5-31-18	0920
Relinquished by/Affiliation:	Date:	Time:	Received by/Affiliation:	Date:	Time:
Relinquished by/Affiliation:	Date: 5-31-18	Time: 1150	Received by/Affiliation: Rachel Morado	Date: 5/31/18	Time: 1150

Method of Shipment: ✓ Lab ____ Bus ____ Fed Ex ____ DHL ____ UPS ____ Client ____ Other Tracking #_____

Comments:

COC Rev. 3.1

APPENDIX B
RAW DATA SHEETS

BIO-ANALYTICAL LABORATORIES
ACUTE TOXICITY TEST WATER QUALITY DATA

Project# X6707

Client: CMDN/Camden Water Utilities

Address: P.O. Box J, Camden, AR 71711

NPDES#AR0022365 Outfall 002

Technicians: EGB/LEM/EDW/MV

Test initiated: Date 5/31/18 Time 1400

Test terminated: Date 6/2/18 Time 1310

Dissolved Oxygen Meter: Model # YSI 550A Serial #06E2089 AV
pH Meter: Model #Orion 230A+ Serial #015253
Conductivity Meter: Model # Fisher Serial #130168768
Amperometric Titrator: Model #Fischer-Porter Serial #92W445766

Sample Information

Sample ID#	Initial D.O. (mg/L and %)	Aerate? Minutes/ Final D.O(mg/L & %)	Total Residual Chlorine (mg/L)	Dechlorinated? Amount?	Ammonia (NH3) mg/L	Salinity	Hardness	Alkalinity	Tech
153270	8.2/106	Y/10/7.5/97.5	<0.01	NO	<0.0	N/A	72.0	80.0	mv
153271	8.4/103	Y/67.9/95.8	<0.01	↓	<0.0	↓	56.0	84.0	mv

Dilution Water Information

Dilution Water	ID#	Initial D.O (mg/L & %)	Aerate? Minutes/D.O (mg/L & %)	Total Residual Chlorine (mg/L)	Ammonia (NH3) mg/L	pH	Hardness	Alkalinity	Tech
Soft Rec	4214					7.4	80.0	20.0	mv

Test Species Information

Test Species Info.	Species:D.pulex ID#:BAI A3A-C10	Species:P.promelas ID#:EGT 913	Species: ID#:	Species: ID#:
Age	< 24 hours	052818 / 3 days		
Test Container Size	50 ml	250 ml		
Test volume	20 ml	200 ml		
Feeding: Type	YCT/Algae	Artemia		
Amount	>/= 2 hours prior to initiation	>/= 2 hours prior to initiation		
Aeration?	None	None		
Amount				
Condition of survivors	good EDW 6/2/18	Poor EDW 6/2/18		

Comments:

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.(

Project# X6707

Client Camden Water Utilities

Sample Description 002

Test started: Date 5/31/18 Time 1330

Test ended: Date 6/2/18 Time 1244

Test Species D. pulex ID# Bel A39-C40

Technician: Ohour MV 24hour EDW 48hour EDW 72hour _____ 96hour _____

Time: Ohour 1330 24hour 1050 48hour 1244 72hour _____ 96hour _____

Temperature (°C): Ohour 25.1 24hour 25.3 48hour 25.3 72hour _____ 96hour _____

Test Dilution	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
0/0																											
0.5	1	N/A	8	8	8			24.3	25.3/27.1	24.4			7.4	7.2/7.4	7.8			7.4	6.9/7.6	7.1			202	221/226	243		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
12.0	1		8	8	8			24.4	25.3/26.9	24.4			7.4	7.4/7.5	7.7			7.3	6.9/7.6	7.1			246	287/278	291		
	2		8	8	8																						
	3		8	8	7																						
	4		8	8	8																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								MV/EDW	EDW	EDW			MV/EDW	EDW	EDW			MV/EDW	EDW	EDW			MV/EDW	EDW	EDW		

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.(

Project# X6707

Client Camden Water Utilities

Test started: Date 5/31/18 Time 1330

Test ended: Date 6/2/18 Time 1244

Sample Description 002

Test Species Duple X ID# BAL A39-C40

Technician: 0hour MV 24hour EDK 48hour EDK 72hour ____ 96hour ____

Time: 0hour 1330 24hour 1050 48hour 1244 72hour ____ 96hour ____

Temperature (°C): 0hour 25.1 24hour 25.3 48hour 25.3 72hour ____ 96hour ____

Test Dilution	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
0/0																											
16.0	1	N/A	8	8	8			25.7	25.0 25.0	24.4			7.4	7.4 7.5	7.5			7.3	7.0 7.7	7.1			320	320 325	300		
	2		8	8	8																						
	3		8	8	7																						
	4		8	8	8																						
	5		8	8	6																						
21.0	1		8	8	8			25.7	26.0 26.0	24.5			7.4	7.8 7.5	7.6			7.3	7.4 7.7	7.1			330	317 320	320		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								MV EDK	EDK	EDK			MV EDK	EDK	EDK			MV EDK	EDK	EDK			MV EDK	EDK	EDK		

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.(

Project# X6707 Test started: Date 5/31/18 Time 1330

Client Camden Water Utilities Test ended: Date 6/2/18 Time 1244

Sample Description 002 Test Species D. pulex ID# BA1 -A39-C40

Technician: 0hour MV 24hour EDW 48hour EDW 72hour 96hour

Time: 0hour 1330 24hour 1050 48hour 1244 72hour 96hour

Temperature (°C): 0hour 25.1 24hour 25.3 48hour 25.3 72hour 96hour

Test Dilution %	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
28.0	1	N/A	8	8	8			27.0	26.0/26.8	24.5			7.4	7.2/7.5	7.5			7.4	7.3/7.8	7.2			323	353/322	337		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	6																						
37.0	1		8	8	8			27.4	26.6/26.6	24.5			7.4	7.1/7.5	7.4			7.4	7.4/7.8	7.3			353	381/360	355		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	7																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								MV	EDW/EDW	EDW			MV	EDW/EDW	EDW			MV	EDW/EDW	EDW			MV	EDW/EDW	EDW		

Test: DA-Daphnid Acute Test | Test ID: CMDN002DP
Species: DP-Daphnia pulex | Protocol: EPAAW02-EPA/821/R-02-012
Sample ID: AR0022365 | Sample Type: EFF1-POTW
Start Date: End Date: | Lab ID: ADEQ880630

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
1	10	5	12						
2	23	3	28						
3	8	3	12						
4	18	3	21						
5	17	2	21						
6	12	2	16						
7	9	4	12						
8	1	1	D-Control						
9	16	1	21						
10	27	2	37						
11	4	4	D-Control						
12	22	2	28						
13	7	2	12						
14	21	1	28						
15	15	5	16						
16	14	4	16						
17	25	5	28						
18	29	4	37						
19	24	4	28						
20	20	5	21						
21	3	3	D-Control						
22	2	2	D-Control						
23	13	3	16						
24	26	1	37						
25	11	1	16						
26	28	3	37						
27	30	5	37						
28	19	4	21						
29	6	1	12						
30	5	5	D-Control						

Comments:

Reviewed by: ECB 5/28/18

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.C

Project# X6707

Client Camden Water Utilities

Sample Description 002

Technician: Ohour MV 24hour MV 48hour EPW 72hour ____ 96hour ____

Time: Ohour 1400 24hour 1330 48hour 1310 72hour ____ 96hour ____

Temperature (°C): Ohour 25.1 24hour 24.7 48hour 25.3 72hour ____ 96hour ____

Test started: Date 5/31/18 Time 1100

Test ended: Date 6/2/18 Time 1310

Test Species P. promelas ID# ECT 05128118

MV 5/31/18

Test Dilution	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
0/0																											
0	1	N/A	8	8	8			24.5	24.3	24.1			7.4	7.0	7.7			7.4	7.0	7.2			237	236	235		
	2		8	8	8																						
	3		8	8	7																						
	4		8	8	8																						
	5		8	8	6																						
12.0	1		8	8	8			24.4	24.3	24.1			7.4	7.1	7.7			7.3	7.1	7.1			241	238	234		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								MV/MV	EDW/EDW				MV/MV	T/T	EDW/EDW			MV/MV	T/T	EDW/EDW			MV/MV	EDW/EDW			

EDW

EDW

EDW

EDW 6/1/18

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.0

Project# X6707 Test started: Date 5/31/18 Time 1400

Client Camden Water Utilities Test ended: Date 6/2/18 Time 1310

Sample Description 002 Test Species P. promelas ID# EOT MV 5/31/18 053818

Technician: 0hour MV 24hour MV 48hour EOW 72hour____ 96hour____

Time: 0hour 1400 24hour 1220 48hour 1310 72hour____ 96hour____

Temperature (°C): 0hour 25.1 24hour 24.7 48hour 25.3 72hour____ 96hour____

Test Dilution	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
0/0			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
16.0	1	N/A	8	8	8			25.1	24.4/24.9	24.1			7.4	7.7/7.5	7.6			7.3	7.1/7.7	7.2			289	285/285	297		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
21.0	1		8	8	8			25.1	24.3/24.9	24.0			7.4	7.7/7.5	7.6			7.3	7.1/7.7	7.2			303	301/300	314		
	2		8	8	8																						
	3		8	8	7																						
	4		8	8	8																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								MV	MV/EOW	EOW			MV	MV/EOW	EOW			MV	MV/EOW	EOW			MV	MV/EOW	EOW		

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.0

Project# X6707
Client Camden Water Utilities
Sample Description 002
Technician: 0hour MV 24hour MV 48hour EDW 72hour ______ 96hour ______
Time: 0hour 1400 24hour 1330 48hour 1310 72hour ______ 96hour ______
Temperature (°C): 0hour 25.1 24hour 24.7 48hour 25.3 72hour ______ 96hour ______

Test started: Date 5/31/18 Time 1400
Test ended: Date 6/2/18 Time 1310
Test Species P. promelas ID# ~~[illegible]~~ EOT 052818 3/31/18

Test Dilution %	Rep.	Test Salinity	# Live Organisms 0 hr	24	48	72	96	Temperature 0	24	48	72	96	Dissolved Oxygen 0	24	48	72	96	pH 0	24	48	72	96	Conductivity 0	24	48	72	96
28.0	1	N/A	8	8	8			25.7	24.9/26.0	23.9			7.4	7.7/7.5	7.5			7.4	7.1/7.8	7.3			333	329/323	337		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	6																						
37.0	1		8	8	8			25.7	24.4/26.0	24.0			7.4	7.7/7.5	7.5			7.4	7.2/7.8	7.4			353	349/360	374		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	7																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								MV	MV/EDW	EDW			MV	MV/EDW	EDW			MV	MV/EDW	EDW			MV	MV/EDW	EDW		

X6707
Page 19 of 36

Test: AC-Acute Fish Test	Test ID: CMDN002PP
Species: PP-Pimephales promelas	Protocol: EPAAW02-EPA/821/R-02-012
Sample ID: AR0022365	Sample Type: EFF1-POTW
Start Date: End Date:	Lab ID: ADEQ880630

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
1	15	5	16						
2	17	2	21						
3	21	1	28						
4	19	4	21						
5	16	1	21						
6	23	3	28						
7	30	5	37						
8	4	4	D-Control						
9	29	4	37						
10	8	3	12						
11	13	3	16						
12	27	2	37						
13	10	5	12						
14	14	4	16						
15	1	1	D-Control						
16	28	3	37						
17	26	1	37						
18	3	3	D-Control						
19	12	2	16						
20	6	1	12						
21	7	2	12						
22	20	5	21						
23	11	1	16						
24	25	5	28						
25	22	2	28						
26	9	4	12						
27	2	2	D-Control						
28	18	3	21						
29	24	4	28						
30	5	5	D-Control						

Comments:

 Reviewed by: ELB 5/28/18

APPENDIX C
STATISTICAL ANALYSES

Daphnid Acute Test-48 Hr Survival

Start Date:	5/31/2018	Test ID:	X6707DP	Sample ID:	AR0022365
End Date:	6/2/2018	Lab ID:	ADEQ880630	Sample Type:	EFF1-POTW
Sample Date:	5/31/2018	Protocol:	EPAAW02-EPA/821/R-02-01	Test Species:	DP-Daphnia pulex
Comments:					

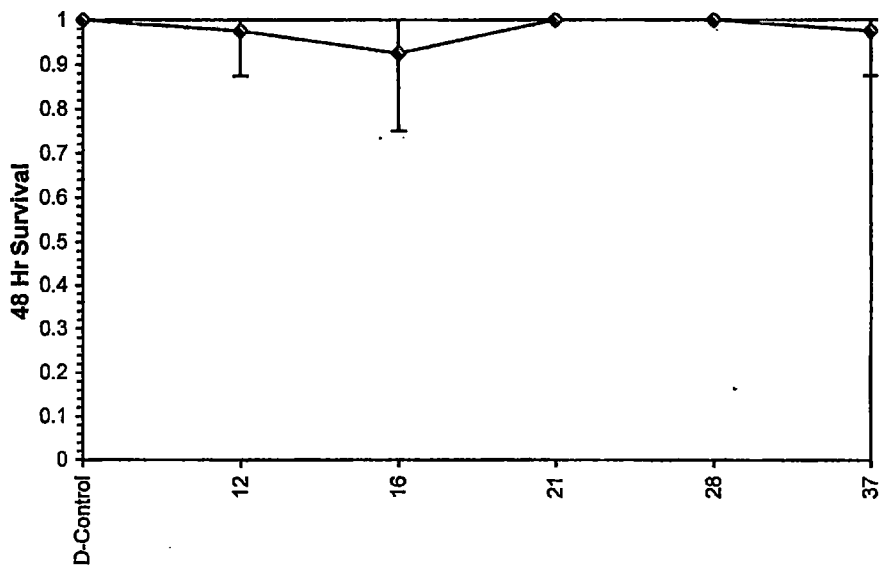
Conc-%	1	2	3	4	5
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000
12	1.0000	1.0000	0.8750	1.0000	1.0000
16	1.0000	1.0000	0.8750	1.0000	0.7500
21	1.0000	1.0000	1.0000	1.0000	1.0000
28	1.0000	1.0000	1.0000	1.0000	1.0000
37	1.0000	1.0000	1.0000	0.8750	1.0000

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
D-Control	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5		
12	0.9750	0.9750	1.3564	1.2094	1.3931	6.055	5	25.00	16.00
16	0.9250	0.9250	1.2872	1.0472	1.3931	12.116	5	22.50	16.00
21	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5	27.50	16.00
28	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5	27.50	16.00
37	0.9750	0.9750	1.3564	1.2094	1.3931	6.055	5	25.00	16.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.76927	0.927	-1.6354	3.95621
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	37	>37		2.7027
Treatments vs D-Control				

Dose-Response Plot



ToxCalc v5.0.23

Reviewed by: EDC 6/4/18

Test: DA-Daphnid Acute Test — Test ID: X6707DP
Species: DP-Daphnia pulex — Protocol: EPAAW02-EPA/821/R-02-012
Sample ID: AR0022365 — Sample Type: EFF1-POTW
Start Date: 5/31/2018 — End Date: 6/2/2018 — Lab ID: ADEQ880630

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	D-Control	8	8	8			
	2	2	D-Control	8	8	8			
	3	3	D-Control	8	8	8			
	4	4	D-Control	8	8	8			
	5	5	D-Control	8	8	8			
	6	1	12	8	8	8			
	7	2	12	8	8	8			
	8	3	12	8	8	7			
	9	4	12	8	8	8			
	10	5	12	8	8	8			
	11	1	16	8	8	8			
	12	2	16	8	8	8			
	13	3	16	8	8	7			
	14	4	16	8	8	8			
	15	5	16	8	8	6			
	16	1	21	8	8	8			
	17	2	21	8	8	8			
	18	3	21	8	8	8			
	19	4	21	8	8	8			
	20	5	21	8	8	8			
	21	1	28	8	8	8			
	22	2	28	8	8	8			
	23	3	28	8	8	8			
	24	4	28	8	8	8			
	25	5	28	8	8	8			
	26	1	37	8	8	8			
	27	2	37	8	8	8			
	28	3	37	8	8	8			
	29	4	37	8	8	7			
	30	5	37	8	8	8			

Comments:

EPW 6/4/18

Acute Fish Test-48 Hr Survival

Start Date:	5/31/2018	Test ID:	X6707PP	Sample ID:	AR0022365
End Date:	6/2/2018	Lab ID:	ADEQ880630	Sample Type:	EFF1-POTW
Sample Date:	5/31/2018	Protocol:	EPAAW02-EPA/821/R-02-01	Test Species:	PP-Pimephales promelas

Comments:

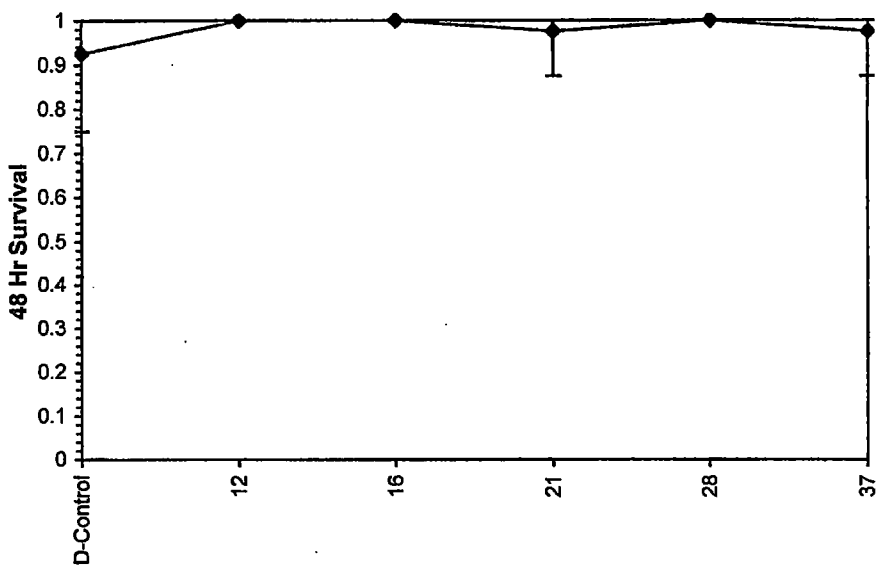
Conc-%	1	2	3	4	5
D-Control	1.0000	1.0000	0.8750	1.0000	0.7500
12	1.0000	1.0000	1.0000	1.0000	1.0000
16	1.0000	1.0000	1.0000	1.0000	1.0000
21	1.0000	1.0000	0.8750	1.0000	1.0000
28	1.0000	1.0000	1.0000	1.0000	1.0000
37	1.0000	1.0000	0.8750	1.0000	1.0000

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
D-Control	0.9250	1.0000	1.2872	1.0472	1.3931	12.116	5		
12	1.0000	1.0811	1.3931	1.3931	1.3931	0.000	5	32.50	16.00
16	1.0000	1.0811	1.3931	1.3931	1.3931	0.000	5	32.50	16.00
21	0.9750	1.0541	1.3564	1.2094	1.3931	6.055	5	30.50	16.00
28	1.0000	1.0811	1.3931	1.3931	1.3931	0.000	5	32.50	16.00
37	0.9750	1.0541	1.3564	1.2094	1.3931	6.055	5	30.50	16.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.76927	0.927	-1.6354	3.95621
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	37	>37		2.7027
Treatments vs D-Control				

Dose-Response Plot



ToxCalc v5.0.23

Reviewed by: ECB 6/12/18

Test: AC-Acute Fish Test | Test ID: X6707PP
Species: PP-Pimephales promelas | Protocol: EPAAW02-EPA/821/R-02-012
Sample ID: AR0022365 | Sample Type: EFF1-POTW
Start Date: 5/31/2018 End Date: 6/2/2018 | Lab ID: ADEQ880630

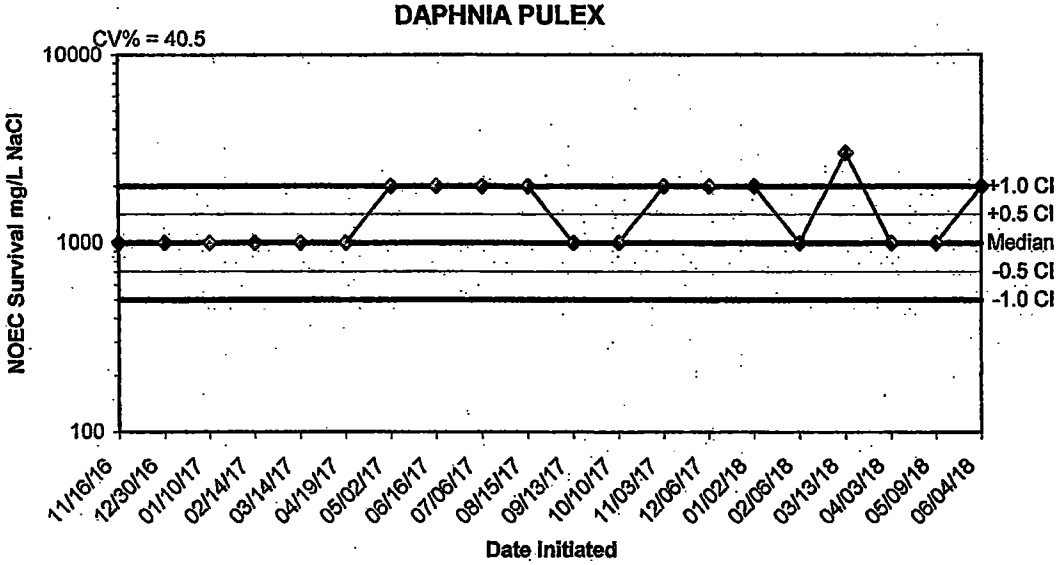
Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	D-Control	8	8	8			
	2	2	D-Control	8	8	8			
	3	3	D-Control	8	8	7			
	4	4	D-Control	8	8	8			
	5	5	D-Control	8	8	6			
	6	1	12	8	8	8			
	7	2	12	8	8	8			
	8	3	12	8	8	8			
	9	4	12	8	8	8			
	10	5	12	8	8	8			
	11	1	16	8	8	8			
	12	2	16	8	8	8			
	13	3	16	8	8	8			
	14	4	16	8	8	8			
	15	5	16	8	8	8			
	16	1	21	8	8	8			
	17	2	21	8	8	8			
	18	3	21	8	8	7			
	19	4	21	8	8	8			
	20	5	21	8	8	8			
	21	1	28	8	8	8			
	22	2	28	8	8	8			
	23	3	28	8	8	8			
	24	4	28	8	8	8			
	25	5	28	8	8	8			
	26	1	37	8	8	8			
	27	2	37	8	8	8			
	28	3	37	8	8	7			
	29	4	37	8	8	8			
	30	5	37	8	8	8			

Comments:

Reviewed by: EGB 6/12/18

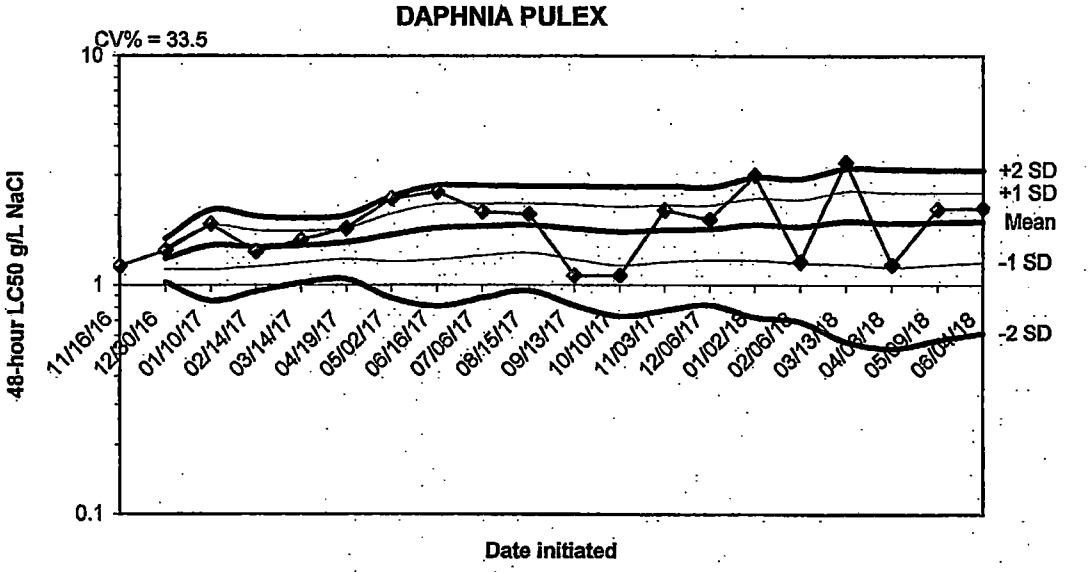
APPENDIX D
QUALITY ASSURANCE CHARTS

2018 48 HOUR ACUTE REFERENCE TOXICANT TEST RESULTS FOR DAPHNIA PULEX



Dates	Values	Median	-0.5 CI	-1.0 CI	+0.5 CI	+1.0 CI
11/16/16	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
12/30/16	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
01/10/17	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
02/14/17	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
03/14/17	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
04/19/17	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
05/02/17	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
06/16/17	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
07/06/17	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
08/15/17	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
09/13/17	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
10/10/17	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
11/03/17	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
12/06/17	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
01/02/18	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
02/06/18	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
03/13/18	3000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
04/03/18	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
05/09/18	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
06/04/18	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000

2018 48 HOUR ACUTE REFERENCE TOXICANT TEST RESULTS FOR DAPHNIA PULEX



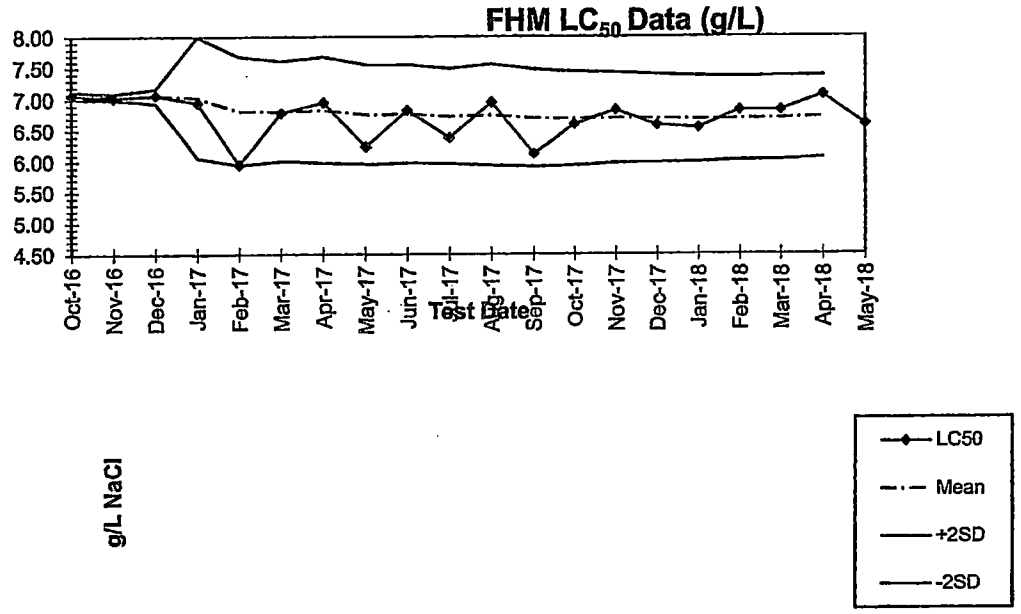
Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
11/16/16	1.2100					
12/30/16	1.4100	1.3100	1.1686	1.0272	1.4514	1.5928
01/10/17	1.8300	1.4833	1.1669	0.8505	1.7998	2.1162
02/14/17	1.4000	1.4625	1.2008	0.9391	1.7242	1.9859
03/14/17	1.5700	1.4840	1.2523	1.0206	1.7157	1.9474
04/19/17	1.7569	1.5295	1.2942	1.0589	1.7648	2.0000
05/02/17	2.3750	1.6503	1.2652	0.8802	2.0353	2.4204
06/16/17	2.5400	1.7615	1.2861	0.8106	2.2369	2.7123
07/06/17	2.0800	1.7969	1.3397	0.8824	2.2541	2.7113
08/15/17	2.0300	1.8202	1.3829	0.9455	2.2575	2.6948
09/13/17	1.1000	1.7547	1.2864	0.8182	2.2230	2.6913
10/10/17	1.0991	1.7001	1.2151	0.7302	2.1850	2.6700
11/03/17	2.1100	1.7316	1.2536	0.7756	2.2096	2.6876
12/06/17	1.9200	1.7451	1.2831	0.8210	2.2071	2.6691
01/02/18	3.0000	1.8287	1.2781	0.7275	2.3794	2.9300
02/06/18	1.2600	1.7932	1.2426	0.6919	2.3438	2.8945
03/13/18	3.4000	1.8877	1.2273	0.5669	2.5481	3.2085
04/03/18	1.2200	1.8506	1.1909	0.5312	2.5103	3.1701
05/09/18	2.1300	1.8653	1.2210	0.5766	2.5096	3.1540
06/04/18	2.1500	1.8796	1.2492	0.6188	2.5099	3.1403

Environmental Consulting and Testing Inc.

Fathead Minnow Acute RTT

Test	Date	LC50	+2SD	-2SD	Mean
1	Oct-16	7.07	#DIV/0!	#####	7.07
2	Nov-16	7.03	7.13	7.01	7.07
3	Dec-16	7.07	7.10	7.00	7.05
4	Jan-17	6.95	7.17	6.94	7.06
5	Feb-17	5.95	8.00	6.06	7.03
6	Mar-17	6.79	7.68	5.95	6.81
7	Apr-17	6.95	7.61	6.01	6.81
8	May-17	6.24	7.68	5.98	6.83
9	Jun-17	6.83	7.55	5.96	6.76
10	Jul-17	6.38	7.55	5.97	6.76
11	Aug-17	6.95	7.49	5.96	6.73
12	Sep-17	6.12	7.56	5.94	6.75
13	Oct-17	6.60	7.47	5.92	6.69
14	Nov-17	6.83	7.44	5.94	6.69
15	Dec-17	6.59	7.42	5.97	6.70
16	Jan-18	6.54	7.39	5.98	6.69
17	Feb-18	6.83	7.37	5.99	6.68
18	Mar-18	6.83	7.36	6.02	6.69
19	Apr-18	7.07	7.37	6.02	6.70
20	May-18	6.59	7.37	6.06	6.72

sd	0.33
cv	5%



APPENDIX E
AGENCY FORMS

Acute Forms
Daphnia pulex Survival

Permittee: Camden Water Utilities
NPDES Permit Number: AR0022365/AFIN 52-00073
Composite Collected **From: 5/29/18** **To: 5/30/18**
From: 5/30/18 **To: 5/31/18**
Test Initiated: 5/31/18
Dilution Water Used: **Receiving Water** **X Reconstituted Water**

Dilution Series Results - Percent Survival

TIME OF READING	REP	0	12.0	16.0	21.0	28.0	37.0
24-hour	A	100.0	100.0	100.0	100.0	100.0	100.0
	B	100.0	100.0	100.0	100.0	100.0	100.0
	C	100.0	100.0	100.0	100.0	100.0	100.0
	D	100.0	100.0	100.0	100.0	100.0	100.0
	E	100.0	100.0	100.0	100.0	100.0	100.0
48-hour	A	100.0	100.0	100.0	100.0	100.0	100.0
	B	100.0	100.0	100.0	100.0	100.0	100.0
	C	100.0	87.5	87.5	100.0	100.0	100.0
	D	100.0	100.0	100.0	100.0	100.0	87.5
	E	100.0	100.0	75.0	100.0	100.0	100.0
	Mean	100.0	97.5	92.5	100.0	100.0	97.5

1. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate: Is the mean survival at 48 hours significantly different (p=.05) than the control survival for the % effluent corresponding to:
a.) LOW FLOW OR CRITICAL DILUTION (28.0%) **YES** **X** **NO**
b.)½ LOW FLOW OR 2X CRITICAL DILUTION (N/A%) **YES** **NO**
2. Enter percent effluent corresponding to the LC_{50} below:
LC_{50} = >37.0% effluent
95 % confidence limits: N/A
Method of LC_{50} calculation: N/A
3. If you answered NO to 1.a) enter (P) otherwise enter (F): P
4. Enter response to item 3 on DMR Form, parameter TEM3D
5. If you answered NO to 1.b) enter (P) otherwise enter (F): N/A
6. Enter response to item 5 on DMR Form, parameter TFM3D

Biomonitoring
Daphnia pulex 48 hour Acute Static Renewal
Chemical Parameters Chart*

Permittee: Camden Water Utilities
NPDES Number: AR0022365/AFIN 52-00073
Contact: Keith Ballard
Analyst: Ware, Valle
Sample Collected **From:** **Date 5/29/18** **Time 0800**
To: **Date 5/30/18** **Time 0800**
Test Begin **Date 5/31/18** **Time 1330**
Test End **Date 6/02/18** **Time 1244**

Parameter	D.O.			Temperature			Alkalinity			Hardness			pH		
Dilut./Time	0hrs.	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs
0.0	7.4	7.4	7.8	25.1	25.3	25.3	20.0			80.0			7.4	7.6	7.1
12.0	7.4	7.5	7.7	25.1	25.3	25.3							7.3	7.6	7.1
16.0	7.4	7.5	7.5	25.1	25.3	25.3							7.3	7.7	7.1
21.0	7.4	7.5	7.6	25.1	25.3	25.3							7.3	7.7	7.1
28.0	7.4	7.5	7.5	25.1	25.3	25.3							7.4	7.8	7.2
37.0	7.4	7.5	7.4	25.1	25.3	25.3	80.0	84.0		72.0	56.0		7.4	7.8	7.3

*This Form is to be submitted with each DMR.
Alkalinity and hardness to be reported as mg/l $CaCO_3$ on 100% effluent.

Acute Forms
Pimephales promelas Survival

Permittee: Camden Water Utilities
NPDES Permit Number: AR0022365/AFIN 52-00073
Composite Collected **From: 5/29/18** **To: 5/30/18**
From: 5/30/18 **To: 5/31/18**
Test Initiated: 5/31/18
Dilution Water Used: **Receiving Water** **X Reconstituted Water**

Dilution Series Results - Percent Survival

TIME OF READING	REP	0	12.0	16.0	21.0	28.0	37.0
24-hour	A	100.0	100.0	100.0	100.0	100.0	100.0
	B	100.0	100.0	100.0	100.0	100.0	100.0
	C	100.0	100.0	100.0	100.0	100.0	100.0
	D	100.0	100.0	100.0	100.0	100.0	100.0
	E	100.0	100.0	100.0	100.0	100.0	100.0
48-hour	A	100.0	100.0	100.0	100.0	100.0	100.0
	B	100.0	100.0	100.0	100.0	100.0	100.0
	C	87.5	100.0	100.0	87.5	100.0	100.0
	D	100.0	100.0	100.0	100.0	100.0	87.5
	E	75.0	100.0	100.0	100.0	100.0	100.0
	Mean	92.5	100.0	100.0	97.5	100.0	97.5

1. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate: Is the mean survival at 48 hours significantly different (p=.05) than the control survival for the % effluent corresponding to:
a.) LOW FLOW OR CRITICAL DILUTION (28.0%) **YES** **X** **NO**
b.)½ LOW FLOW OR 2X CRITICAL DILUTION (N/A%) **YES** **NO**
2. Enter percent effluent corresponding to the LC_{50} below:
LC_{50} = >37.0% effluent
95 % confidence limits: N/A
Method of LC_{50} calculation: N/A
3. If you answered NO to 1.a) enter (P) otherwise enter (F): P
4. Enter response to item 3 on DMR Form, parameter TEM3D
5. If you answered NO to 1.b) enter (P) otherwise enter (F): N/A
6. Enter response to item 5 on DMR Form, parameter TFM3D

Biomonitoring
Pimephales promelas 48 hour Acute Static Renewal
Chemical Parameters Chart*

Permittee: Camden Water Utilities
NPDES Number: AR0022365/AFIN 52-00073
Contact: Keith Ballard
Analyst: Ware, Valle
Sample Collected **From:** **Date 5/29/18** **Time 0800**
To: **Date 5/30/18** **Time 0800**
Test Begin **Date 5/31/18** **Time 1400**
Test End **Date 6/02/18** **Time 1310**

Parameter	D.O.			Temperature			Alkalinity			Hardness			pH		
Dilut./Time	0hrs.	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs
0.0	7.4	7.4	7.7	25.1	24.7	25.3	20.0			80.0			7.4	7.6	7.2
12.0	7.4	7.5	7.7	25.1	24.7	25.3							7.3	7.6	7.1
16.0	7.4	7.5	7.6	25.1	24.7	25.3							7.3	7.7	7.2
21.0	7.4	7.5	7.6	25.1	24.7	25.3							7.3	7.7	7.2
28.0	7.4	7.5	7.5	25.1	24.7	25.3							7.4	7.8	7.3
37.0	7.4	7.5	7.5	25.1	24.7	25.3	80.0	84.0		72.0	56.0		7.4	7.8	7.4

*This Form is to be submitted with each DMR.
Alkalinity and hardness to be reported as mg/l $CaCO_3$ on 100% effluent.

APPENDIX F
REPORT QUALITY ASSURANCE FORM

Bio-Analytical Laboratories
3240 Spurgin Road
Post Office Box 527
Doyline, LA 71023
(318) 745-2772
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REPORT QUALITY ASSURANCE FORM

Client: Camden Water Utilities

Project#: X6707

Chain of Custody Documents Checked by: Emily Moore 6/4/18
Technician/Date

Raw Data Documents Checked by: Emily Moore 6/4/18
Technician/Date

Statistical Analysis Package Checked by: EGB 6/12/18
Quality Manager/Date

Quality Control Data Checked by: EGB 6/12/18
Quality Manager/Date

Report Checked by: EGB 6/12/18
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.

Erin G. Boggs, BS — 6-12-18
Quality Manager — Date

Report Rev. 3.0

Bio-Analytical Laboratories (BAL)
ADEQ #880630
Project X6785

Bio-Analytical Laboratories' Executive Summary

Permittee: Camden Water Utilities
P.O. Box J
Camden, AR 71711
Project #: X6785
Outfall: 002 (treated sanitary wastewater)
Permit #: AR0022365/ AFIN 52-00073
Contact: Mr. Keith Ballard
Test Dates: August 15 - 17, 2018
Test Type: 48-hour Acute Definitive Toxicity Test using *Pimephales promelas*- (EPA Method 2000.0)
48-hour Acute Definitive Toxicity Test using *Daphnia pulex* (EPA Method 2021.0)

Results:

For *Daphnia pulex:*
1. If the NOEC for survival is less than the critical dilution (28.0%), enter a "1"; otherwise, enter a "0" for Parameter No. TEM3D - 0 **(Pass).**
2. Report the NOEC value for survival, Parameter No. TOM3D - 37.0%.
3. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQM3D- 6.59%.

For *Pimephales promelas:*
1. If the NOEC for survival is less than the critical dilution (28.0%), enter a "1"; otherwise, enter a "0" for Parameter No. TEM6C - 0 **(Pass).**
2. Report the NOEC value for survival, Parameter No. TOM6C - 37.0%.
3. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQM6C - 16.10%.

This report contains a total of 37 pages, including this page. The information within pertains only to the samples listed in the chain of custody documents. The results comply with the 2009 TNI standard. The chemical data recorded in this report are for monitoring purposes only and should not be reported on discharge monitoring reports.

Bio-Analytical Laboratories

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THE RESULTS OF TWO 48-HOUR ACUTE DEFINITIVE TOXICITY TESTS FOR OUTFALL 002 AT

CAMDEN WATER UTILITIES
Camden, Arkansas

NPDES #AR0022365
AFIN #52-00073

EPA Methods 2000.0 and 2021.0

Project X6785

Test Dates: August 15 - 17, 2018

Report Date: September 7, 2018

Prepared for:
Mr. Keith Ballard
Camden Water Utilities
P.O. Box J
Camden, AR 71711

Prepared by:
Ginger Briggs
Bio-Analytical Laboratories
P.O. Box 527
Doyline, LA 71023
ADEQ #880630

BAL
ADEQ #880630
Project X6785

TABLE OF CONTENTS

1.0 Introduction	4
2.0 Methods and Materials	4
2.1 Test Methods	4
2.2 Test Organisms	4
2.3 Dilution Water	4
2.4 Test Concentrations	5
2.5 Sample Collection	5
2.6 Sample Preparation	5
2.7 Monitoring of the Tests	5
2.8 Data Analysis	5
3.0 Results and Discussion	6
4.0 Conclusions	7
5.0 References	8
Appendices	
A- Chain-of-Custody Documents	9
B- Raw Data Sheets	11
C- Statistical Analyses	21
D- Quality Assurance Charts	26
E - Agency Forms	31
F- Report Quality Assurance Form	36

BAL
ADEQ #880630
Project X6785

1.0 Introduction

Bio-Analytical Laboratories (BAL), Doyline, Louisiana conducted two 48-hour acute definitive toxicity tests for Outfall 002 at the wastewater treatment plant operated by Camden Water Utilities, Camden, Arkansas . Such testing will determine compliance with the Water Quality Standard, of greater than 50 percent survival of the appropriate test organism in the defined low-flow effluent concentration (critical dilution) for a 48-hour period. The test organisms used were the cladoceran, *Daphnia pulex* and the fathead minnow, *Pimephales promelas*. The test endpoints are the No-Observed-Effect-Concentration (NOEC), which is defined as the highest effluent concentration that is not statistically different from the control, and the Lethal Concentration (LC_{50}), which is the effluent concentration at which 50 percent of the test organisms die.

2.0 Methods and Materials

2.1 Test Methods

All methods followed were according to the latest edition of "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms" (EPA-821-R-02-012), "Standard Methods (SM) for The Examination of Water and Wastewater. 20th Edition" (APHA 1998. Each chemical method listed in the report as SM 1997) and BAL's standard operating procedure.

2.2 Test Organisms

The *Daphnia pulex* test organisms were cultured in-house at test temperature and were less than 24 hours old at test initiation. The fathead minnows were also raised in-house at test temperature and were approximately 7 days old at test initiation. The minnows were acclimated to dilution water hardness prior to test initiation. Forty-eight hour reference toxicant tests were conducted a minimum of once monthly in order to document organism sensitivity.

2.3 Dilution Water

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

BAL
ADEQ #880630
Project X6785

2.4 Test Concentrations

The test concentrations used in the acute toxicity tests were 37.0, 28.0, 21.0, 16.0 and 12.0 percent effluent and a control. The critical dilution was defined as 28.0 percent effluent. The tests were conducted using 5 replicates of 8 animals each for a total of 40 animals per concentration.

2.5 Sample Collection

Two 24-hour composite samples of Outfall 002 were collected by Camden Water Utilities personnel on August 14 and 15, 2018, at 0800 hours. Upon completion of collection, the samples were packed in ice and delivered to Bio-Analytical Laboratories by BAL personnel. The temperature upon arrival of each set of samples was 1.3^0 Celsius, respectively.

2.6 Sample Preparation

Upon arrival, the samples were logged in, given an identification number and refrigerated unless needed. Prior to use, each sample was warmed to 25 ± 1^0 Celsius. Total residual chlorine levels (SM 4500-Cl E) were measured in milligrams/Liter (mg/L) with a Capital Controls^R amperometric titrator and recorded if present. Total ammonia levels were measured in mg/L using a test strip. Dissolved oxygen (SM 4500-O G), pH (SM 4500-H+ B) and conductivity (SM 2510 B) measurements, in mg/L, standard units and umhos/cm, respectively, were taken on the control and each test concentration at test initiation, at test renewal and at test termination. Alkalinity (SM 2320B) and hardness (SM 2340 C) levels were measured in mg/L as $CaCO_3$ on the control and the highest effluent concentration.

2.7 Monitoring of the Tests

The tests were run in a Precision^R dual programmable illuminated incubator set at a temperature of 25 ± 1^0 Celsius. An AEMC^R data logger was used to monitor diurnal temperature throughout the testing period. Light cycle and intensity were recorded twice a month.

2.8 Data Analysis

Survival data was analyzed using the ToxCalc v5.0.23 statistical program to obtain the No- Observed- Effect- Concentration (NOEC) values. The LC_{50} values were also obtained using the ToxCalc program.

BAL
ADEQ #880630
Project X6785

3.0 Results and Discussion

The results of the definitive tests can be found in Table 1. The mean survival in the 28.0 percent critical dilution was greater than 50 percent after 48 hours of exposure in both tests. The NOEC value for the *Daphnia pulex* and the fathead minnow test was 37.0 percent effluent (p.= .05). The 48-hour LC_{50} value for the *Daphnia pulex* and fathead minnow test was >37.0 percent effluent (p=.05).

Table 1: Results of the 48-hour Acute Definitive Toxicity Tests

Percent Effluent	Percent Survival	
Test Organism	*D. pulex*	*P.promelas*
Control	97.5	90.0
12.0	87.5	92.5
16.0	87.5	87.5
21.0	85.0	92.5
28.0	90.0	87.5
37.0	90.0	95.0

The 48-hour reference toxicant test results indicate that the test organisms were within the respective sensitivity range. The graphs of the results of the acute reference toxicant tests can be found in Appendix D- Quality Assurance Charts.

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ADEQ #880630
Project X6785

4.0 Conclusions

The two composite samples of Outfall 002 collected from Camden Water Utilities' wastewater treatment plant on August 14 and 15, 2018, were not found to be lethally toxic to the *Daphnia pulex* test organisms nor the *Pimephales promelas* test organisms in the 28.0 percent critical dilution after 48 hours of exposure (p=.05).

BAL
ADEQ #880630
Project X6785

5.0 References

EPA, 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. EPA-821-R-02-012, 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
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NELAP/LELAP 01975, ADEQ 88-0630, TCEQ T104704278

Laboratory Use Only:

Company: Camden Water Utilities				**Phone:** (870) 836-4329		**Analysis:**									**Project Number:** X6785
Address: P.O. Box J, Camden, AR 71711				**Fax:** (870) 836-5190											**Temp. upon arrival:** 1.3
Permit #: AR0022365/ AFIN 52-00073				**Purchase Order:**											**Therm#:** 29
Sampler's Signature/Printed Name/Affiliation:															**Color:** clear
															Odor: none
															Tech: EDW
Date Start / **Date End**	**Time Start** / **Time End**	**C**	**G**	**# and type of container**	**Sample Identification**									**Lab Control Number:**	**Preservative: (below)**
8-13-18 / 8-14-18	8:00 Am / 8:00 Am	X		2 half gallons	002- Day 1									C15768	ICE
8-14-18 / 8-15-18	8:00 Am / 8:00 Am	X		2 half gallons	002- Day 2									C15769	↓

Relinquished by/Affiliation: Annette Strickland	**Date:** 8-15-18	**Time:** 9:36 A	**Received by/Affiliation:**	**Date:** 8-15-18	**Time:** 0936
Relinquished by/Affiliation:	**Date:**	**Time:**	**Received by/Affiliation:**	**Date:**	**Time:**
Relinquished by/Affiliation:	**Date:** 8-15-18	**Time:** 1215	**Received by/Affiliation:** Emily Moore	**Date:** 8/15/18	**Time:** 1215

Method of Shipment: ✓ Lab ___ Bus ___ Fed Ex ___ DHL ___ UPS ___ Client ___ Other **Tracking #**_____

Comments:

COC Rev. 3.1

APPENDIX B
RAW DATA SHEETS

BIO-ANALYTICAL LABORATORIES
ACUTE TOXICITY TEST WATER QUALITY DATA

Project# X6785

Client: CMDN/Camden Water Utilities

Address: P.O. Box J, Camden, AR 71711

NPDES#AR0022365 Outfall 002

Technicians: EGB/LEM/EDW EDW 8/15/18

Test initiated: Date 8/15/18 Time 1326

Test terminated: Date 8/17/18 Time 1310

Dissolved Oxygen Meter: Model # YSI 550A Serial #06E2089 AV
pH Meter: Model #Orion 230A+ Serial #015253
Conductivity Meter: Model # Fisher Serial #130168768
Amperometric Titrator: Model #Fischer-Porter Serial #92W445766

Sample Information

Sample ID#	Initial D.O. (mg/L and %)	Aerate? Minutes/ Final D.O(mg/L & %)	Total Residual Chlorine (mg/L)	Dechlorinated? Amount?	Ammonia (NH3) mg/L	Salinity	Hardness	Alkalinity	Tech
EDW 8/15/18 C15168	8.4/99.1	8 NO	<0.01	NO	0.5	N/A	44.0	44.0	EDW
C15169	8.6/99.2	NO	<0.01	↓	6.0	↓	172.0	80.0	LEM

Dilution Water Information

Dilution Water	ID#	Initial D.O (mg/L & %)	Aerate? Minutes/D.O (mg/L & %)	Total Residual Chlorine (mg/L)	Ammonia (NH3) mg/L	pH	Hardness	Alkalinity	Tech
Soft Rec	0252	—			—	7.7	36.0	28.0	EDW

Test Species Information

Test Species Info.	Species:D.pulex ID#: BAL0820-P8	Species:P.promelas ID#: BAL080818	Species: ID#:	Species: ID#:
Age	< 24 hours	7 days		
Test Container Size	50 ml	250 ml		
Test volume	20 ml	200 ml		
Feeding: Type	YCT/Algae	Artemia		
Amount	>/= 2 hours prior to initiation	>/= 2 hours prior to initiation		
Aeration?	NO ↓	NO ↓		
Amount				
Condition of survivors	Good LEM 8/17/18	Pale LEM 8/17/18		

Comments:

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.0

Project# X6785

Client Camden

Sample Description 002

Test started: Date 8/15/18 Time 1326

Test ended: Date 8/17/18 Time 1245

Test Species D. pulex ID# BAL 06-F8

Technician: 0hour EM 24hour EM 48hour EM 72hour ___ 96hour ___

Time: 0hour 1326 24hour 1020 48hour 1245 72hour ___ 96hour ___

Temperature (°C): 0hour 25.4 24hour 24.9 48hour 25.3 72hour ___ 96hour ___

Test Dilution %	Rep.	Test Salinity	# Live Organisms 0 hr	24	48	72	96	Temperature 0	24	48	72	96	Dissolved Oxygen 0	24	48	72	96	pH 0	24	48	72	96	Conductivity 0	24	48	72	96
0s	1	n/A	8	8	7			28.4	25.3/27.8	25.0			7.2	8.0/7.4	7.9			6.4	6.7/5.7	6.6			191.0	197/187.3	201		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
12	1		8	8	7			27.8	25.5/27.0	25.1			7.3	7.9/7.6	8.0			6.6	6.8/6.0	6.8			208	215/226	243		
	2		8	8	8																						
	3		8	8	7																						
	4		8	8	5																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								EM	EM/EM	EM			EM	EM/EM	EM			EM	EM/EM	EM			EM	EM/EM	EM		

X6785
Page 13 of 37

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.0

Project# X6785

Client Camden

Sample Description 002

Technician:

Time: Ohour 1320 24hour 1000 48hour 1245 72hour ____ 96hour ____

Temperature (°C): Ohour 25.4 24hour 24.9 48hour 25.3 72hour ____ 96hour ____

Test started: Date 8/15/18 Time 1326

Test ended: Date 8/17/18 Time 1245

Test Species D. pulex ID# BMDe-F8

Test Dilution	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
C		N/A																									
16	1		8	7	7			27.7	25.4 25.7	25.4			7.3	7.6	7.0			6.8	6.9 6.2	6.9			211	217 221	241		
	2		8	8	6																						
	3		8	8	8																						
	4		8	8	7																						
	5		8	7	7																						
21	1		8	8	8			27.7	25.4 25.9	25.3			7.4	7.4	7.9			7.9	7.0 7.4	7.0			217	233 229	250		
	2		8	8	5																						
	3		8	8	6																						
	4		8	8	7																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								EM	EM	EM			EM	EM	EM			EM	EM	EM			EM	EM	EM		

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.

Project# X6785
Client Camden
Sample Description 002

Test started: Date 8/15/18 Time 1326
Test ended: Date 8/17/18 Time 1245
Test Species D. pulex ID# BALD6-P8

Technician: 0hour EM 24hour EM 48hour EM 72hour ____ 96hour ____
Time: 0hour 1326 24hour 1020 48hour 1245 72hour ____ 96hour ____
Temperature (°C): 0hour 25.4 24hour 24.9 48hour 25.3 72hour ____ 96hour ____

Test Dilution	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
%		n/A	0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
28	1		8	8	7			27.1	25.6/26.4	25.4			7.5	7.9/7.7	7.9			7.2	7.1/6.6	7.1			208	235/208	251/208		
	2		8	8	8																						
	3		8	8	7																						
	4		8	8	7																						
	5		8	8	7																						
37	1		8	8	7			26.6	25.8/26.0				7.6	7.8/7.8	7.9			7.0	7.2/6.7	7.1			245	249/276	276		
	2		8	8	7																						
	3		8	8	8																						
	4		8	8	6																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								EM	EM/EM	EM			EM	EM/EM	EM			EM	EM/EM	EM			EM	EM/EM	EM		

Test: DA-Daphnid Acute Test							Test ID: CMDNDPA		
Species: DP-Daphnia pulex							Protocol: EPAAW02-EPA/821/R-02-012		
Sample ID: AR0022365							Sample Type: EFF1-POTW		
Start Date:		End Date:					Lab ID: ADEQ880630		
Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
1	9	4	12						
2	5	5	D-Control						
3	12	2	16						
4	15	5	16						
5	24	4	28						
6	14	4	16						
7	10	5	12						
8	25	5	28						
9	17	2	21						
10	22	2	28						
11	19	4	21						
12	16	1	21						
13	30	5	37						
14	29	4	37						
15	26	1	37						
16	21	1	28						
17	23	3	28						
18	6	1	12						
19	1	1	D-Control						
20	20	5	21						
21	7	2	12						
22	4	4	D-Control						
23	13	3	16						
24	18	3	21						
25	2	2	D-Control						
26	27	2	37						
27	8	3	12						
28	11	1	16						
29	3	3	D-Control						
30	28	3	37						

Comments:

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.0

Project# X6785

Client Camden

Sample Description 002

Test started: Date 8/15/18 Time 1403

Test ended: Date 8/17/18 Time 1310

Test Species P. promelas ID# BAL080818

Technician: 0hour EDW 24hour [illegible] 48hour [illegible] 72hour ____ 96hour ____

Time: 0hour 1400 24hour [illegible] 48hour 1310 72hour ____ 96hour ____

Temperature (°C): 0hour 25.4 24hour [illegible] 48hour 25.3 72hour ____ 96hour ____

Test Dilution %	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
0	1	N/A	8	8	7			25.4	24.3	24.3			7.2	7.4	8.0			6.4	5.7	6.1			191	183.4	186.1		
	2		8	8	6																						
	3		8	8	8																						
	4		8	8	7																						
	5		8	8	8																						
10	1		8	8	8			22.8	24.3	24.3			7.3	7.8	7.9			6.6	6.4	6.6			208	203	203		
	2		8	7	7																						
	3		8	8	8																						
	4		8	8	6																						
	5		8	8	8																						

Chemistry Tech prerenewal/postrenewal EDW/EDW EDW/EDW EDW/EDW EDW/EDW

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.(

Project# X6785

Client Camden

Test started: Date 8/15/18 Time 1403

Test ended: Date 8/19/18 Time 1310

Sample Description OO2

Test Species P. promelas ID# BAL080818

Technician:	0hour EDW	24hour KAM	48hour KAM	72hour ____	96hour ____
Time:	0hour 1403	24hour 1440	48hour 1310	72hour ____	96hour ____
Temperature (°C):	0hour 25.4	24hour 24.9	48hour 25.3	72hour ____	96hour ____

Test Dilution	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
%		n/a																									
10	1		8	6	4			21.7	24.2 / 24.7	24.3			7.3	2.8 / 2.6	7.9			6.8	6.4 / 6.9	6.8			211	203 / 201	330		
	2		8	8	7																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
21	1		8	8	8			21.7	24.1 / 24.9	24.3			7.4	2.8 / 2.7	7.8			7.0	6.5 / 6.8	6.9			212	210 / 208	345		
	2		8	8	8																						
	3		8	7	5																						
	4		8	8	8																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								KAM	KAM / KAM	KAM			EDW	KAM / KAM	KAM			EDW	KAM / KAM	KAM			KAM	KAM / KAM	KAM		

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.(

Project# X6785

Client Camden

Sample Description 002

Test started: Date 8/15/18 Time 1403

Test ended: Date 8/17/18 Time 1310

Test Species P. promelas ID# BAL080818

Technician: 0hour EDW 24hour FBM 48hour FBM 72hour____ 96hour____

Time: 0hour 1403 24hour 0940 48hour 1310 72hour____ 96hour____

Temperature (°C): 0hour 25.4 24hour 24.9 48hour 25.3 72hour____ 96hour____

Test Dilution	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
%		n/a	0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
28	1		8	8	5			27.1	24.6/26.8	24.3			7.5	7/7.7	7.7			7.0	6.8/6.6	6.9			229	233/252	266		
	2		8	8	8																						
	3		8	8	7																						
	4		8	8	8																						
	5		8	7	7																						
37	1		8	8	8			26.6	24.1/26.4	24.4			7.6	7.7/7.8	7.5			7.0	6.6/6.7	7.0			245	243/276	291		
	2		8	8	7																						
	3		8	7	7																						
	4		8	8	8																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								EDW	EDW/EDW	FBM			EDW	EDW/EDW	FBM			EDW	EDW/EDW	FBM			EDW	EDW/EDW	FBM		

Fish Acute 8/17/18

X 6785

Test: LF-~~Larval Fish Growth and Survival Test~~ Test ID: CMDNPPA
Species: PP-Pimephales promelas Protocol: EPAAW02-EPA/821/R-02-012
Sample ID: AR0022365 Sample Type: EFF1-POTW
Start Date: End Date: Lab ID: ADEQ880630

Pos	ID	Rep	Group	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Total Wgt(	Tare Wgt(	Wgt Count
1	11	1	16											
2	12	2	16											
3	19	4	21											
4	7	2	12											
5	15	5	16											
6	30	5	37											
7	18	3	21											
8	5	5	D-Control											
9	16	1	21											
10	20	5	21											
11	26	1	37											
12	23	3	28											
13	3	3	D-Control											
14	6	1	12											
15	17	2	21											
16	4	4	D-Control											
17	9	4	12											
18	28	3	37											
19	24	4	28											
20	2	2	D-Control											
21	10	5	12											
22	13	3	16											
23	1	1	D-Control											
24	8	3	12											
25	25	5	28											
26	27	2	37											
27	22	2	28											
28	21	1	28											
29	14	4	16											
30	29	4	37											

Comments:

APPENDIX C
STATISTICAL ANALYSES

Daphnid Acute Test-48 Hr Survival

Start Date:	8/15/2018	Test ID:	X6785DPA	Sample ID:	AR0022635
End Date:	8/17/2018	Lab ID:	ADEQ880630	Sample Type:	EFF1-POTW
Sample Date:	8/15/2018	Protocol:	EPAAW02-EPA/821/R-02-01	Test Species:	DP-Daphnia pulex

Comments:

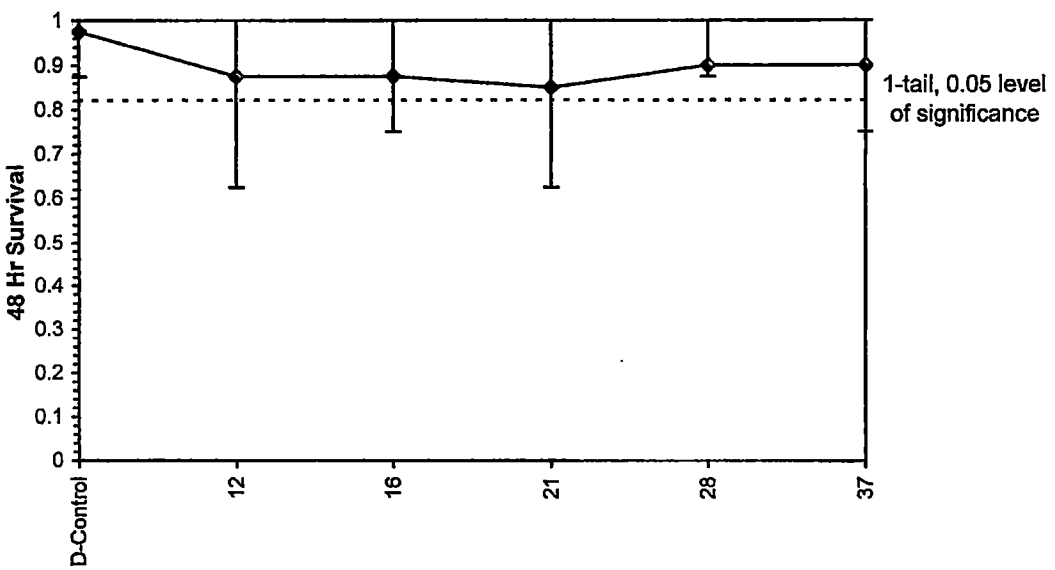
Conc-%	1	2	3	4	5
D-Control	0.8750	1.0000	1.0000	1.0000	1.0000
12	0.8750	1.0000	0.8750	0.6250	1.0000
16	0.8750	0.7500	1.0000	0.8750	0.8750
21	1.0000	0.6250	0.7500	0.8750	1.0000
28	0.8750	1.0000	0.8750	0.8750	0.8750
37	0.8750	0.8750	1.0000	0.7500	1.0000

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	0.9750	1.0000	1.3564	1.2094	1.3931	6.055	5			
12	0.8750	0.8974	1.2234	0.9117	1.3931	16.097	5	1.408	2.360	0.2229
16	0.8750	0.8974	1.2137	1.0472	1.3931	10.087	5	1.510	2.360	0.2229
21	0.8500	0.8718	1.1909	0.9117	1.3931	17.846	5	1.752	2.360	0.2229
28	0.9000	0.9231	1.2462	1.2094	1.3931	6.591	5	1.167	2.360	0.2229
37	0.9000	0.9231	1.2504	1.0472	1.3931	11.683	5	1.121	2.360	0.2229

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)	0.93438	0.927	-0.4459	-0.0701
Bartlett's Test indicates equal variances (p = 0.33)	5.73103	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs D-Control	37	>37		2.7027	0.13407	0.14043	0.01678	0.0223	0.59226	5, 24

Dose-Response Plot



ToxCalc v5.0.23

Reviewed by: 8/19/18
EGB 8/20/18

Test: DA-Daphnid Acute Test						Test ID: X6785DPA			
Species: DP-Daphnia pulex						Protocol: EPAAW02-EPA/821/R-02-012			
Sample ID: AR0022635						Sample Type: EFF1-POTW			
Start Date: 8/15/2018			End Date: 8/17/2018			Lab ID: ADEQ880630			
Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	D-Control	8	8	7			
	2	2	D-Control	8	8	8			
	3	3	D-Control	8	8	8			
	4	4	D-Control	8	8	8			
	5	5	D-Control	8	8	8			
	6	1	12	8	8	7			
	7	2	12	8	8	8			
	8	3	12	8	8	7			
	9	4	12	8	8	5			
	10	5	12	8	8	8			
	11	1	16	8	7	7			
	12	2	16	8	8	6			
	13	3	16	8	8	8			
	14	4	16	8	8	7			
	15	5	16	8	7	7			
	16	1	21	8	8	8			
	17	2	21	8	8	5			
	18	3	21	8	8	6			
	19	4	21	8	8	7			
	20	5	21	8	8	8			
	21	1	28	8	8	7			
	22	2	28	8	8	8			
	23	3	28	8	8	7			
	24	4	28	8	8	7			
	25	5	28	8	8	7			
	26	1	37	8	8	7			
	27	2	37	8	8	7			
	28	3	37	8	8	8			
	29	4	37	8	8	6			
	30	5	37	8	8	8			

Comments:

Reviewed by: 8/19/18
ESB 8/20/18

Acute Fish Test-48 Hr Survival

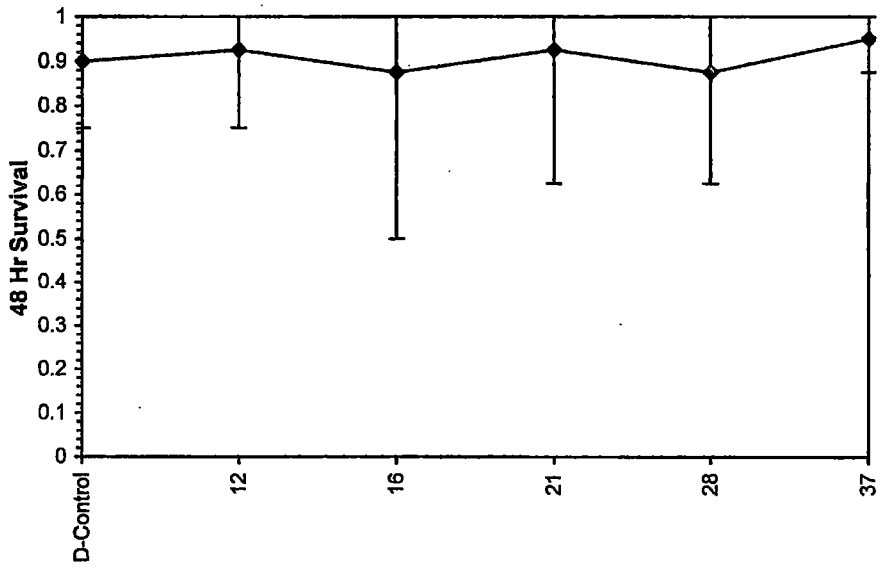
Start Date:	8/15/2018	Test ID:	X6785PPA	Sample ID:	AR0022635
End Date:	8/17/2018	Lab ID:	ADEQ880630	Sample Type:	EFF1-POTW
Sample Date:	8/15/2018	Protocol:	EPAAW02-EPA/821/R-02-01	Test Species:	PP-Pimephales promelas
Comments:					

Conc-%	1	2	3	4	5
D-Control	0.8750	0.7500	1.0000	0.8750	1.0000
12	1.0000	0.8750	1.0000	0.7500	1.0000
16	0.5000	0.8750	1.0000	1.0000	1.0000
21	1.0000	1.0000	0.6250	1.0000	1.0000
28	0.6250	1.0000	0.8750	1.0000	0.8750
37	1.0000	0.8750	0.8750	1.0000	1.0000

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
D-Control	0.9000	1.0000	1.2504	1.0472	1.3931	11.683	5		
12	0.9250	1.0278	1.2872	1.0472	1.3931	12.116	5	29.50	16.00
16	0.8750	0.9722	1.2348	0.7854	1.3931	21.341	5	29.00	16.00
21	0.9250	1.0278	1.2968	0.9117	1.3931	16.600	5	31.00	16.00
28	0.8750	0.9722	1.2234	0.9117	1.3931	16.097	5	27.00	16.00
37	0.9500	1.0556	1.3196	1.2094	1.3931	7.623	5	31.00	16.00

Auxiliary Tests				Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)				0.84485	0.927	-1.2549	0.83303
Bartlett's Test indicates equal variances (p = 0.58)				3.7953	15.0863		
Hypothesis Test (1-tail, 0.05)	**NOEC**	**LOEC**	**ChV**	**TU**			
Steel's Many-One Rank Test	37	>37		2.7027			
Treatments vs D-Control							

Dose-Response Plot



Reviewed by LZM 8/9/18
EWB 8/20/18

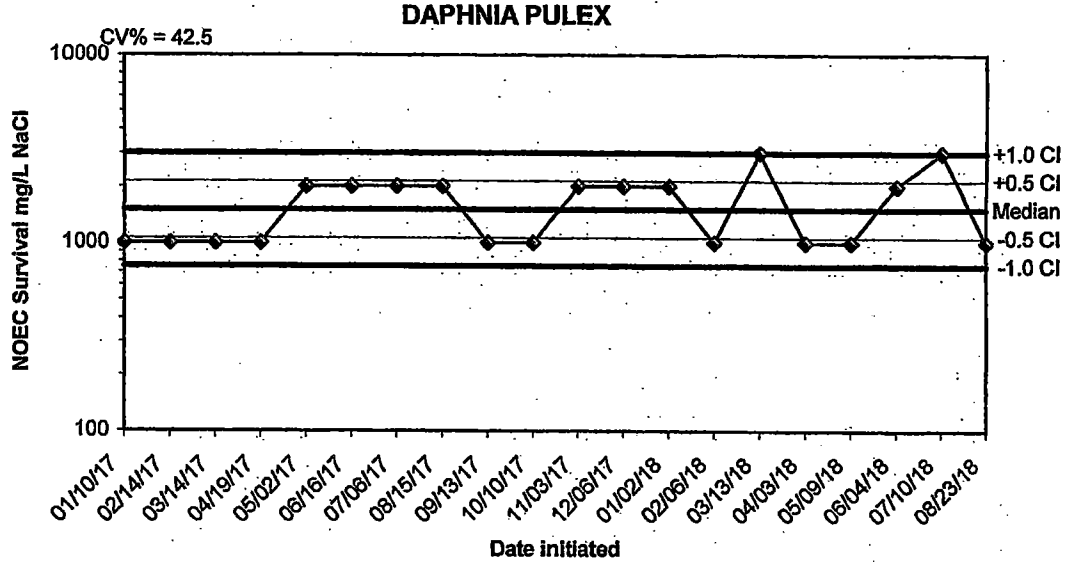
Test: AC-Acute Fish Test						Test ID: X6785PPA			
Species: PP-Pimephales promelas						Protocol: EPAAW02-EPA/821/R-02-012			
Sample ID: AR0022635						Sample Type: EFF1-POTW			
Start Date: 8/15/2018			End Date: 8/17/2018			Lab ID: ADEQ880630			
Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	D-Control	8	8	7			
	2	2	D-Control	8	8	6			
	3	3	D-Control	8	8	8			
	4	4	D-Control	8	8	7			
	5	5	D-Control	8	8	8			
	6	1	12	8	8	8			
	7	2	12	8	7	7			
	8	3	12	8	8	8			
	9	4	12	8	8	6			
	10	5	12	8	8	8			
	11	1	16	8	8	4			
	12	2	16	8	8	7			
	13	3	16	8	8	8			
	14	4	16	8	8	8			
	15	5	16	8	8	8			
	16	1	21	8	8	8			
	17	2	21	8	8	8			
	18	3	21	8	7	5			
	19	4	21	8	8	8			
	20	5	21	8	8	8			
	21	1	28	8	8	5			
	22	2	28	8	8	8			
	23	3	28	8	8	7			
	24	4	28	8	8	8			
	25	5	28	8	7	7			
	26	1	37	8	8	8			
	27	2	37	8	8	7			
	28	3	37	8	7	7			
	29	4	37	8	8	8			
	30	5	37	8	8	8			

Comments:

Reviewed by: BM 8/19/18
EDS 8/20/18

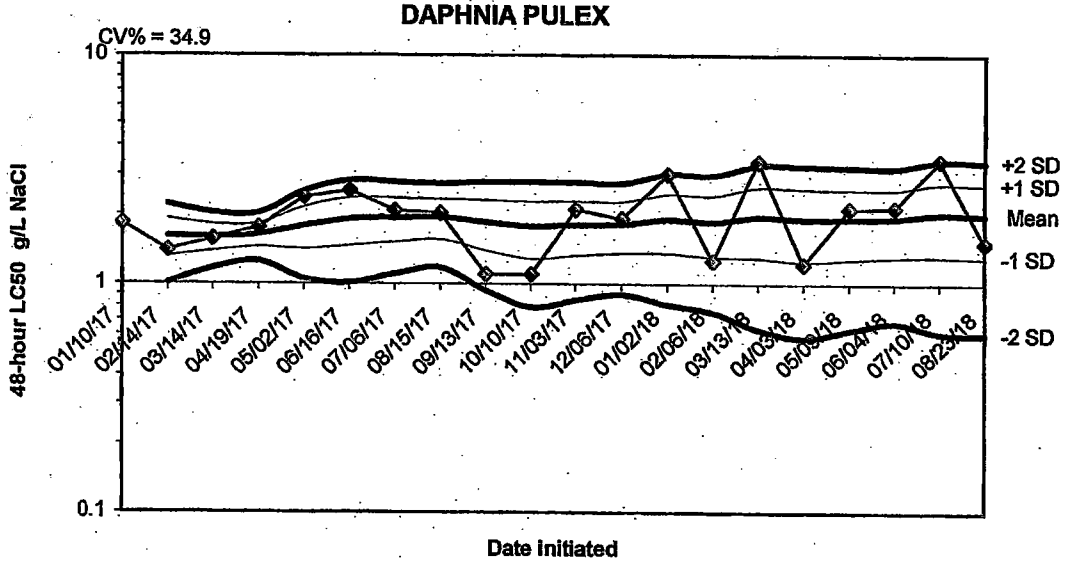
APPENDIX D
QUALITY ASSURANCE CHARTS

2018 48-HOUR ACUTE REFERENCE TOXICANT TEST RESULTS FOR DAPHNIA PULEX



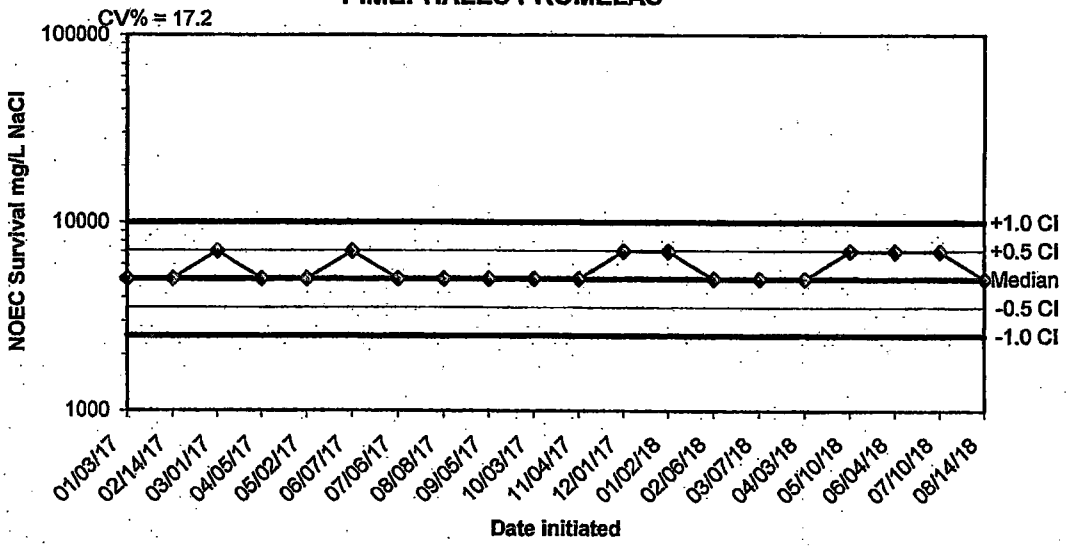
Dates	Values	Median	-0.5 CI	-1.0 CI	+0.5 CI	+1.0 CI
01/10/17	1000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
02/14/17	1000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
03/14/17	1000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
04/19/17	1000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
05/02/17	2000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
06/16/17	2000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
07/06/17	2000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
08/15/17	2000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
09/13/17	1000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
10/10/17	1000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
11/03/17	2000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
12/06/17	2000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
01/02/18	2000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
02/06/18	1000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
03/13/18	3000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
04/03/18	1000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
05/09/18	1000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
06/04/18	2000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
07/10/18	3000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
08/23/18	1000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000

2018 48-HOUR ACUTE REFERENCE TOXICANT TEST RESULTS FOR DAPHNIA PULEX



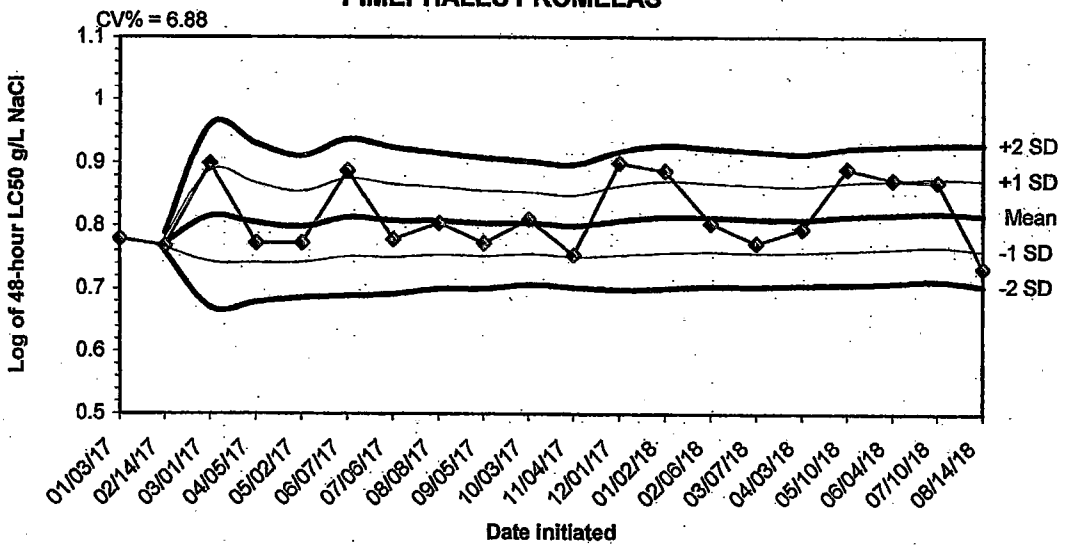
Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
01/10/17	1.8300					
02/14/17	1.4000	1.6150	1.3109	1.0069	1.9191	2.2231
03/14/17	1.5700	1.6000	1.3834	1.1669	1.8166	2.0331
04/19/17	1.7569	1.6392	1.4458	1.2523	1.8327	2.0261
05/02/17	2.3750	1.7864	1.4171	1.0479	2.1556	2.5249
06/16/17	2.5400	1.9120	1.4606	1.0093	2.3633	2.8147
07/06/17	2.0800	1.9360	1.5191	1.1022	2.3529	2.7698
08/15/17	2.0300	1.9477	1.5603	1.1729	2.3351	2.7225
09/13/17	1.1000	1.8535	1.3940	0.9345	2.3131	2.7726
10/10/17	1.0991	1.7781	1.2835	0.7889	2.2727	2.7673
11/03/17	2.1100	1.8083	1.3285	0.8487	2.2880	2.7678
12/06/17	1.9200	1.8176	1.3590	0.9004	2.2762	2.7347
01/02/18	3.0000	1.9085	1.3605	0.8125	2.4565	3.0046
02/06/18	1.2600	1.8622	1.3079	0.7536	2.4165	2.9708
03/13/18	3.4000	1.9647	1.2992	0.6336	2.6303	3.2958
04/03/18	1.2200	1.9182	1.2488	0.5794	2.5876	3.2570
05/09/18	2.1300	1.9306	1.2805	0.6303	2.5808	3.2310
06/04/18	2.1500	1.9428	1.3100	0.6771	2.5757	3.2086
07/10/18	3.4600	2.0227	1.3160	0.6093	2.7294	3.4361
08/23/18	1.5100	1.9971	1.2997	0.6024	2.6944	3.3917

2018 48-HOUR ACUTE REFERENCE TOXICANT TEST RESULTS FOR PIMEPHALES PROMELAS



Dates	Values	Median	-0.5 CI	-1.0 CI	+0.5 CI	+1.0 CI
01/03/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
02/14/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
03/01/17	7000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
04/05/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
05/02/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
06/07/17	7000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
07/06/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
08/08/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
09/05/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
10/03/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
11/04/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
12/01/17	7000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
01/02/18	7000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
02/06/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
03/07/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
04/03/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
05/10/18	7000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
06/04/18	7000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
07/10/18	7000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
08/14/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000

2018 48-HOUR ACUTE REFERENCE TOXICANT TEST RESULTS FOR PIMEPHALES PROMELAS



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
01/03/17	0.7789					
02/14/17	0.7679	0.7734	0.7656	0.7579	0.7811	0.7889
03/01/17	0.8987	0.8152	0.7426	0.6700	0.8877	0.9603
04/05/17	0.7723	0.8045	0.7414	0.6784	0.8675	0.9305
05/02/17	0.7723	0.7980	0.7416	0.6852	0.8545	0.9109
06/07/17	0.8871	0.8129	0.7507	0.6885	0.8751	0.9373
07/06/17	0.7782	0.8079	0.7496	0.6914	0.8662	0.9245
08/08/17	0.8041	0.8074	0.7535	0.6995	0.8614	0.9154
09/05/17	0.7723	0.8035	0.7517	0.6999	0.8554	0.9072
10/03/17	0.8102	0.8042	0.7553	0.7064	0.8531	0.9020
11/04/17	0.7536	0.7996	0.7508	0.7019	0.8484	0.8973
12/01/17	0.8998	0.8080	0.7531	0.6983	0.8628	0.9176
01/02/18	0.8871	0.8140	0.7572	0.7003	0.8709	0.9278
02/06/18	0.8041	0.8133	0.7586	0.7039	0.8681	0.9228
03/07/18	0.7723	0.8106	0.7568	0.7030	0.8644	0.9182
04/03/18	0.7952	0.8096	0.7575	0.7054	0.8617	0.9138
05/10/18	0.8899	0.8144	0.7603	0.7062	0.8684	0.9225
06/04/18	0.8727	0.8176	0.7634	0.7091	0.8718	0.9261
07/10/18	0.8692	0.8203	0.7663	0.7123	0.8743	0.9283
08/14/18	0.7324	0.8159	0.7598	0.7037	0.8721	0.9282

APPENDIX E
AGENCY FORMS

Acute Forms
Daphnia pulex Survival

Permittee: Camden Water Utilities
NPDES Permit Number: AR0022365/AFIN 52-00073
Composite Collected **From: 8/13/18** **To: 8/14/18**
From: 8/14/18 **To: 8/15/18**
Test Initiated: 8/15/18
Dilution Water Used: **Receiving Water** **X Reconstituted Water**

Dilution Series Results - Percent Survival

TIME OF READING	REP	0	12.0	16.0	21.0	28.0	37.0
24-hour	A	100.0	100.0	87.5	100.0	100.0	100.0
	B	100.0	100.0	100.0	100.0	100.0	100.0
	C	100.0	100.0	100.0	100.0	100.0	100.0
	D	100.0	100.0	100.0	100.0	100.0	100.0
	E	100.0	100.0	87.5	100.0	100.0	100.0
48-hour	A	87.5	87.5	87.5	100.0	87.5	87.5
	B	100.0	100.0	75.0	62.5	100.0	87.5
	C	100.0	87.5	100.0	75.0	87.5	100.0
	D	100.0	62.5	87.5	87.5	87.5	75.0
	E	100.0	100.0	87.5	100.0	87.5	100.0
	Mean	97.5	87.5	87.5	85.0	90.0	90.0

1. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate: Is the mean survival at 48 hours significantly different (p=.05) than the control survival for the % effluent corresponding to:
a.) LOW FLOW OR CRITICAL DILUTION (28.0%) **YES** **X** **NO**
b.)½ LOW FLOW OR 2X CRITICAL DILUTION (N/A%) **YES** **NO**
2. Enter percent effluent corresponding to the LC_{50} below:
LC_{50} = >37.0% effluent
95 % confidence limits: N/A
Method of LC_{50} calculation: N/A
3. If you answered NO to 1.a) enter (P) otherwise enter (F): P
4. Enter response to item 3 on DMR Form, parameter TEM3D
5. If you answered NO to 1.b) enter (P) otherwise enter (F): N/A
6. Enter response to item 5 on DMR Form, parameter TFM3D

Biomonitoring
Daphnia pulex 48 hour Acute Static Renewal
Chemical Parameters Chart*

Permittee: Camden Water Utilities
NPDES Number: AR0022365/AFIN 52-00073
Contact: Keith Ballard
Analyst: Morado

Sample Collected	**From:**	**Date 8/13/18**	**Time 0800**
	To:	**Date 8/14/18**	**Time 0800**
Test Begin		**Date 8/15/18**	**Time 1326**
Test End		**Date 8/17/18**	**Time 1245**

Parameter	D.O.			Temperature			Alkalinity			Hardness			pH		
Dilut./Time	0hrs.	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs
0.0	7.2	7.4	7.9	25.4	24.8	25.3	28.0			56.0			6.4	5.7	6.6
12.0	7.3	7.6	8.0	25.4	24.8	25.3							6.6	6.0	6.8
16.0	7.3	7.6	8.0	25.4	24.8	25.3							6.8	6.2	6.9
21.0	7.4	7.7	7.9	25.4	24.8	25.3							7.0	6.4	7.0
28.0	7.5	7.7	7.9	25.4	24.8	25.3							7.0	6.6	7.1
37.0	7.6	7.8	7.9	25.4	24.8	25.3	44.0	44.0		72.0	80.0		7.0	6.7	7.1

*This Form is to be submitted with each DMR.
Alkalinity and hardness to be reported as mg/l $CaCO_3$ on 100% effluent.

Acute Forms
Pimephales promelas Survival

Permittee: Camden Water Utilities
NPDES Permit Number: AR0022365/AFIN 52-00073
Composite Collected **From: 8/13/18** **To: 8/14/18**
From: 8/14/18 **To: 8/15/18**
Test Initiated: 8/15/18
Dilution Water Used: **Receiving Water** **X Reconstituted Water**

Dilution Series Results - Percent Survival

TIME OF READING	REP	0	12.0	16.0	21.0	28.0	37.0
24-hour	A	100.0	100.0	75.0	100.0	100.0	100.0
	B	100.0	87.5	100.0	100.0	100.0	100.0
	C	100.0	100.0	100.0	87.5	100.0	87.5
	D	100.0	100.0	100.0	100.0	100.0	100.0
	E	100.0	100.0	100.0	100.0	87.5	100.0
48-hour	A	87.5	100.0	50.0	100.0	62.5	100.0
	B	75.0	87.5	87.5	100.0	100.0	87.5
	C	100.0	100.0	100.0	62.5	87.5	87.5
	D	87.5	75.0	100.0	100.0	100.0	100.0
	E	100.0	100.0	100.0	100.0	87.5	100.0
	Mean	90.0	92.5	87.5	92.5	87.5	95.0

1. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate: Is the mean survival at 48 hours significantly different (p=.05) than the control survival for the % effluent corresponding to:
a.) LOW FLOW OR CRITICAL DILUTION (28.0%) **YES** **X** **NO**
b.)½ LOW FLOW OR 2X CRITICAL DILUTION (N/A%) **YES** **NO**
2. Enter percent effluent corresponding to the LC_{50} below:
LC_{50} = >37.0% effluent
95 % confidence limits: N/A
Method of LC_{50} calculation: N/A
3. If you answered NO to 1.a) enter (P) otherwise enter (F): P
4. Enter response to item 3 on DMR Form, parameter TEM3D
5. If you answered NO to 1.b) enter (P) otherwise enter (F): N/A
6. Enter response to item 5 on DMR Form, parameter TFM3D

Biomonitoring
Pimephales promelas 48 hour Acute Static Renewal
Chemical Parameters Chart*

Permittee: Camden Water Utilities
NPDES Number: AR0022365/AFIN 52-00073
Contact: Keith Ballard
Analyst: Ware, Morado

Sample Collected	**From:**	**Date 8/13/18**	**Time 0800**
	To:	**Date 8/14/18**	**Time 0800**
Test Begin		**Date 8/15/18**	**Time 1403**
Test End		**Date 8/17/18**	**Time 1310**

Parameter	D.O.			Temperature			Alkalinity			Hardness			pH		
Dilut./Time	0hrs.	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs
0.0	7.2	7.4	8.0	25.4	24.9	24.3	28.0			56.0			6.4	5.7	6.4
12.0	7.3	7.6	7.9	25.4	24.9	24.3							6.6	6.0	6.6
16.0	7.3	7.6	7.9	25.4	24.9	24.3							6.8	6.2	6.8
21.0	7.4	7.7	7.8	25.4	24.9	24.3							7.0	6.4	6.9
28.0	7.5	7.7	7.7	25.4	24.9	24.3							7.0	6.6	6.9
37.0	7.6	7.8	7.5	25.4	24.9	24.3	44.0	44.0		72.0	80.0		7.0	6.7	7.0

*This Form is to be submitted with each DMR.
Alkalinity and hardness to be reported as mg/l $CaCO_3$ on 100% effluent.

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) 746-2773

REPORT QUALITY ASSURANCE FORM

Client: Camden Water Utilities

Project#: X6785

Chain of Custody Documents Checked by: Raina Mercado 8/19/18
Technician/Date

Raw Data Documents Checked by: Raina Mercado 8/19/18
Technician/Date

Statistical Analysis Package Checked by: EGB 8/20/18
Quality Manager/Date

Quality Control Data Checked by: EGB 9/10/18
Quality Manager/Date

Report Checked by: EGB 9/10/18
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.

Erin L. Briggs, BS — 9/10/18
Quality Manager — Date

Report Rev. 3.0

Bio-Analytical Laboratories (BAL)
ADEQ #880630
Project X6879

Bio-Analytical Laboratories' Executive Summary

Permittee: Camden Water Utilities
P.O. Box J
Camden, AR 71711
Project #: X6879
Outfall: 002 (treated sanitary wastewater)
Permit #: AR0022365/ AFIN 52-00073
Contact: Mr. Keith Ballard
Test Dates: November 28 - 30, 2018
Test Type: 48-hour Acute Definitive Toxicity Test using *Pimephales promelas*- (EPA Method 2000.0)
48-hour Acute Definitive Toxicity Test using *Daphnia pulex* (EPA Method 2021.0)

Results:

For *Daphnia pulex:*
1. If the NOEC for survival is less than the critical dilution (28.0%), enter a "1"; otherwise, enter a "0" for Parameter No. TEM3D - 0 **(Pass).**
2. Report the NOEC value for survival, Parameter No. TOM3D - 37.0%.
3. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQM3D- 0.00%.

For *Pimephales promelas:*
1. If the NOEC for survival is less than the critical dilution (28.0%), enter a "1"; otherwise, enter a "0" for Parameter No. TEM6C - 0 **(Pass).**
2. Report the NOEC value for survival, Parameter No. TOM6C - 37.0%.
3. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQM6C - 6.06%.

This report contains a total of 37 pages, including this page. The information within pertains only to the samples listed in the chain of custody documents. The results comply with the 2009 TNI standard. The chemical data recorded in this report are for monitoring purposes only and should not be reported on discharge monitoring reports.

Bio-Analytical Laboratories

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Fax: (318) 745-2773

THE RESULTS OF TWO 48-HOUR ACUTE DEFINITIVE TOXICITY TESTS FOR OUTFALL 002 AT

CAMDEN WATER UTILITIES
Camden, Arkansas

NPDES #AR0022365
AFIN #52-00073

EPA Methods 2000.0 and 2021.0

Project X6879

Test Dates: November 28 - 30, 2018

Report Date: December 24, 2018

Prepared for:
Mr. Keith Ballard
Camden Water Utilities
P.O. Box J
Camden, AR 71711

Prepared by:
Ginger Briggs
Bio-Analytical Laboratories
P.O. Box 527
Doyline, LA 71023
ADEQ #880630

BAL
ADEQ #880630
Project X6879

TABLE OF CONTENTS

1.0 Introduction	4
2.0 Methods and Materials	4
2.1 Test Methods	4
2.2 Test Organisms	4
2.3 Dilution Water	4
2.4 Test Concentrations	5
2.5 Sample Collection	5
2.6 Sample Preparation	5
2.7 Monitoring of the Tests	5
2.8 Data Analysis	5
3.0 Results and Discussion	6
4.0 Conclusions	7
5.0 References	8
Appendices	
A- Chain-of-Custody Documents	9
B- Raw Data Sheets	11
C- Statistical Analyses	21
D- Quality Assurance Charts	26
E - Agency Forms	31
F- Report Quality Assurance Form	36

BAL
ADEQ #880630
Project X6879

1.0 Introduction

Bio-Analytical Laboratories (BAL), Doyline, Louisiana conducted two 48-hour acute definitive toxicity tests for Outfall 002 at the wastewater treatment plant operated by Camden Water Utilities, Camden, Arkansas . Such testing will determine compliance with the Water Quality Standard, of greater than 50 percent survival of the appropriate test organism in the defined low-flow effluent concentration (critical dilution) for a 48-hour period. The test organisms used were the cladoceran, *Daphnia pulex* and the fathead minnow, *Pimephales promelas.* The test endpoints are the No-Observed-Effect-Concentration (NOEC), which is defined as the highest effluent concentration that is not statistically different from the control, and the Lethal Concentration (LC_{50}), which is the effluent concentration at which 50 percent of the test organisms die.

2.0 Methods and Materials

2.1 Test Methods

All methods followed were according to the latest edition of "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms" (EPA-821-R-02-012), "Standard Methods (SM) for The Examination of Water and Wastewater. 20th Edition" (APHA 1998. Each chemical method listed in the report as SM 1997) and BAL's standard operating procedure.

2.2 Test Organisms

The *Daphnia pulex* test organisms were cultured in-house at test temperature and were less than 24 hours old at test initiation. The fathead minnows were also raised in-house at test temperature and were approximately 13 days old at test initiation. The minnows were acclimated to dilution water hardness prior to test initiation. Forty-eight hour reference toxicant tests were conducted a minimum of once monthly in order to document organism sensitivity.

2.3 Dilution Water

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

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ADEQ #880630
Project X6879

2.4 Test Concentrations

The test concentrations used in the acute toxicity tests were 37.0, 28.0, 21.0, 16.0 and 12.0 percent effluent and a control. The critical dilution was defined as 28.0 percent effluent. The tests were conducted using 5 replicates of 8 animals each for a total of 40 animals per concentration.

2.5 Sample Collection

Two 24-hour composite samples of Outfall 002 were collected by Camden Water Utilities personnel on November 27 and 28, 2018, at 0800 hours. Upon completion of collection, the samples were packed in ice and delivered to Bio-Analytical Laboratories by BAL personnel. The temperature upon arrival of each set of samples was 0.4 and 0.5^0 Celsius, respectively.

2.6 Sample Preparation

Upon arrival, the samples were logged in, given an identification number and refrigerated unless needed. Prior to use, each sample was warmed to 25 ± 1^0 Celsius. Total residual chlorine levels (SM 4500-Cl E) were measured in milligrams/Liter (mg/L) with a Capital Controls^R amperometric titrator and recorded if present. Total ammonia levels were measured in mg/L using a test strip. Dissolved oxygen (SM 4500-O G), pH (SM 4500-H+ B) and conductivity (SM 2510 B) measurements, in mg/L, standard units and umhos/cm, respectively, were taken on the control and each test concentration at test initiation, at test renewal and at test termination. Alkalinity (SM 2320B) and hardness (SM 2340 C) levels were measured in mg/L as $CaCO_3$ on the control and the highest effluent concentration.

2.7 Monitoring of the Tests

The tests were run in a Precision^R dual programmable illuminated incubator set at a temperature of 25 ± 1^0 Celsius. An AEMC^R data logger was used to monitor diurnal temperature throughout the testing period. Light cycle and intensity were recorded twice a month.

2.8 Data Analysis

Survival data was analyzed using the ToxCalc v5.0.23 statistical program to obtain the No- Observed- Effect- Concentration (NOEC) values. The LC_{50} values were also obtained using the ToxCalc program.

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ADEQ #880630
Project X6879

3.0 Results and Discussion

The results of the definitive tests can be found in Table 1. The mean survival in the 28.0 percent critical dilution was greater than 50 percent after 48 hours of exposure in both tests. The NOEC value for the *Daphnia pulex* and the fathead minnow test was 37.0 percent effluent (p.= .05). The 48-hour LC_{50} value for the *Daphnia pulex* and fathead minnow test was >37.0 percent effluent (p=.05).

Table 1: Results of the 48-hour Acute Definitive Toxicity Tests

Percent Effluent	Percent Survival	
Test Organism	*D. pulex*	*P.promelas*
Control	100.0	100.0
12.0	100.0	92.5
16.0	100.0	87.5
21.0	87.5	100.0
28.0	100.0	97.5
37.0	95.0	95.0

The 48-hour reference toxicant test results indicate that the test organisms were within the respective sensitivity range. The graphs of the results of the acute reference toxicant tests can be found in Appendix D- Quality Assurance Charts.

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Project X6879

4.0 Conclusions

The two composite samples of Outfall 002 collected from Camden Water Utilities' wastewater treatment plant on November 27 and 28, 2018, were not found to be lethally toxic to the *Daphnia pulex* test organisms nor the *Pimephales promelas* test organisms in the 28.0 percent critical dilution after 48 hours of exposure (p=.05).

BAL
ADEQ #880630
Project X6879

5.0 References

EPA, 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. EPA-821-R-02-012, 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
Doyline, LA 71023
(318) 745-2772
1-800-259-1246
Fax (318) 745-2773

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

Laboratory Use Only:

Company: Camden Water Utilities				**Phone:** (870) 836-4329		**Analysis:**											**Project Number:** X6879	
Address: P.O. Box J, Camden, AR 71711				**Fax:** (870) 836-5190													**Temp. upon arrival:** 0.4 / 0.5	
Permit #: AR0022365/ AFIN 52-00073				**Purchase Order:**													**Therm#:** #29	
Sampler's Signature/Printed Name/Affiliation:																	**Color:** clear / clear	
																	Odor: none / none	
																	Tech: BDJ	
Date Start / **Date End**	**Time Start** / **Time End**	**C**	**G**	**# and type of container**	**Sample Identification**	Chronic Ceriodaphnia	Chronic minnow	Acute minnow(fresh/marine)	Acute Daphnia species	Acute Mysid	Acute Ceriodaphnia	Fecal Coliform	**Lab Control Number:**	**Preservative: (below)**				
11-26-18 ~~8-26-18~~ / 11-27-18 8-27-18	8:00 AM / 8:00 AM	X		2 half gallons	002- Day 1			X	X				C16280	ICE				
11-27-18 ~~8-27-18~~ / 11-28-18 8-28-18	8:00 AM / 8:00 AM*	X		2 half gallons	002- Day 2			X	X				C16281	ICE				
BDJ 11/28/18																		
Relinquished by/Affiliation: Annette Strickland					**Date:** 11-28-18	**Time:** 10:50 AM	**Received by/Affiliation:** Alisha Rodenkirch						**Date:** 11-28-18	**Time:** 10:50 AM				
Relinquished by/Affiliation: Alisha Rodenkirch					**Date:** 11-28-18	**Time:** 2:00pm	**Received by/Affiliation:** Erin Bragg						**Date:** 11/28/18	**Time:** 1406				
Relinquished by/Affiliation:					**Date:**	**Time:**	**Received by/Affiliation:**						**Date:**	**Time:**				

Method of Shipment: _____ Lab _____ Bus _____ Fed Ex _____ DHL _____ UPS _____ Client _____Other **Tracking #**_____

Comments:

COC Rev. 3.1 * BDJ 11/28/18

APPENDIX B
RAW DATA SHEETS

BIO-ANALYTICAL LABORATORIES
ACUTE TOXICITY TEST WATER QUALITY DATA

Project# X6879

Client: CMDN/Camden Water Utilities

Address: P.O. Box J, Camden, AR 71711

NPDES#AR0022365 Outfall 002

Technicians: EGB/LEM/EDW,BDJ

Test initiated: Date 11/28/18 Time 1610

Test terminated: Date 11/30/18 Time 1523

Dissolved Oxygen Meter: Model # YSI 550A Serial #06E2089 AV
pH Meter: Model #Orion 230A+ Serial #015253
Conductivity Meter: Model # Fisher Serial #130168768
Amperometric Titrator: Model #Fischer-Porter Serial #92W445766

Sample Information

Sample ID#	Initial D.O. (mg/L and %)	Aerate? Minutes/ Final D.O(mg/L & %)	Total Residual Chlorine (mg/L)	Dechlorinated? Amount?	Ammonia (NH3) mg/L	Salinity	Hardness	Alkalinity	Tech
C16280	9.2/102%	Y/6/8.1/95.6%	<0.01	NO	0	N/A	40	12	EDW
C16281	9.3/115.3%	Y/6/8.1/96.2%	↓	↓	↓	↓	40	16	EDW

Dilution Water Information

Dilution Water	ID#	Initial D.O (mg/L & %)	Aerate? Minutes/D.O (mg/L & %)	Total Residual Chlorine (mg/L)	Ammonia (NH3) mg/L	pH	Hardness	Alkalinity	Tech
Soft Rec	4325					8.0	44	32	EDW
	↓								

Test Species Information

Test Species Info.	Species:D.pulex ID#: BAL 021-F23	Species:P.promelas ID#: BAL 111518	Species: ID#:	Species: ID#:
Age	< 24 hours	≤13 days		
Test Container Size	50 ml	250 ml		
Test volume	20 ml	200 ml		
Feeding: Type	YCT/Algae	Artemia		
Amount	>/= 2 hours prior to initiation	>/= 2 hours prior to initiation		
Aeration?	None	None		
Amount	↓	↓		
Condition of survivors	Great EDW 11/30/18	Fair EDW 11/30/18		

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. :

Project# X6879 | Test started: Date 11/28/18 | Time 1540
Client Camden | Test ended: Date 11/30/18 | Time 1445
Sample Description 002 | Test Species D. pulex | ID# D21-F23 BAL

Technician: 0hour BR 24hour BR 48hour EDW 72hour ____ 96hour ____
Time: 0hour 1540 24hour 1455 48hour 1445 72hour ____ 96hour ____
Temperature (°C): 0hour 25.0 24hour 25.2 48hour 25.0 72hour ____ 96hour ____

Test Dilution	Rep.	Test Salinity	# Live Organisms 0 hr	24	48	72	96	Temperature 0	24	48	72	96	Dissolved Oxygen 0	24	48	72	96	pH 0	24	48	72	96	Conductivity 0	24	48	72	96
%		nA																									
0s	1		8	8	8			25.1	24.3/25.0	23.8			7.7	8.1/7.9	8.0			7.4	7.4/7.6	7.0			202	208/203	214		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
12	1		8	8	8			25.1	23.8/25.1	23.3			7.7	7.9/[illegible]	7.9			7.4	7.0/7.4	7.0			219	228/214	223		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								EDW	BR/EDW	EDW			EDW	BR/EDW	EDW			EDW	BR/EDW	EDW			EDW	BR/EDW	EDW		

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2

Project# X6879

Client Camden

Sample Description 002

Technician:

Time:

Temperature (°C):

Test started: Date 11/28/18 Time 1540

Test ended: Date 11/30/18 Time 1445

Test Species D. pulex ID# 021-F23-BAL

	0hour	24hour	48hour	72hour	96hour
Technician:	BD	9M	EDV		
Time:	1540	1455	1445		
Temperature (°C):	25.0	25.2	25.3		

Test Dilution %	Rep	Test Salinity	# Live Organisms 0 hr	24	48	72	96	Temperature 0	24	48	72	96	Dissolved Oxygen 0	24	48	72	96	pH 0	24	48	72	96	Conductivity 0	24	48	72	96
16	1		8	8	8			25.1	23.2	23.4			7.5	7.9	7.6			7.3	7.9	7.0			218	222	216		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
21	1		8	8	8			25.1	23.2	23.4			7.6	7.9	7.8			7.3	7.9	7.1			220	223	223		
	2		8	6	5																						
	3		8	6	6																						
	4		8	8	8																						
	5		8	8	8																						

Chemistry from pre-renewal/post-renewal

EDV EDV EDV EDV EDV EDV EDV EDV EDV EDV

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2

Project# X6879 Test started: Date 11/28/18 Time 1540

Client Camden Test ended: Date 11/30/18 Time 1445

Sample Description Test Species D. pulex ID# 081-F23 BAC

Technician: 0hour BAU 24hour ERM 48hour EOW 72hour 96hour

Time: 0hour 1540 24hour 1455 48hour 1445 72hour 96hour

Temperature (°C): 0hour 25.0 24hour 25.2 48hour 25.3 72hour 96hour

Test Dilution	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
%		N/A	0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
28	1		8	8	8			25.1	24.3/25.[illegible]	23.8			7.6	8.0/7.8	7.8			7.3	7.3/7.3	7.1			225	249/227	251		
	2		8	8	8																						
	3		8	9	8																						
	4		8	8	8																						
	5		8	[illegible]	8																						
37	1		8	8	8			25.1	23.7/25.[illegible]	23.4			7.7	7.9/7.8	7.7			7.3	6.9/7.0	7.1			236	240/240	254		
	2		8	8	8																						
	3		8	7	7																						
	4		8	7	7																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								EOW	BAU/EAN	EOW			EOW	BAU/EAN	EOW			EOW	BAU/EAN	EOW			EOW	BAU/EAN	EOW		

Test: DA-Daphnid Acute Test | Test ID: CMDNDPA
Species: DP-Daphnia pulex | Protocol: EPAAW02-EPA/821/R-02-012
Sample ID: AR0022365 | Sample Type: EFF2-Industrial
Start Date: End Date: | Lab ID: ADEQ880630

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
1	9	4	12						
2	26	1	37						
3	30	5	37						
4	28	3	37						
5	4	4	D-Control						
6	3	3	D-Control						
7	13	3	16						
8	10	5	12						
9	24	4	28						
10	7	2	12						
11	18	3	21						
12	25	5	28						
13	29	4	37						
14	2	2	D-Control						
15	22	2	28						
16	21	1	28						
17	8	3	12						
18	17	2	21						
19	23	3	28						
20	5	5	D-Control						
21	27	2	37						
22	15	5	16						
23	20	5	21						
24	11	1	16						
25	16	1	21						
26	12	2	16						
27	6	1	12						
28	14	4	16						
29	19	4	21						
30	1	1	D-Control						

Comments:

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2

Project# X6879

Client Camden

Sample Description 002

Technician:

Time:

Temperature (°C): 0hour 25.0 24hour 25.2 48hour 23.3 72hour 96hour

Test started: Date 11/28/18 Time 1610

Test ended: Date 11/30/18 Time 525

Test Species P. promelas ID# 111518 BAL

0hour 800 24hour 800 48hour Exc

0hour 1610 24hour 1515 48hour 1523

Test Dilution	Rep	Test Salinity	Organisms 0 hr	Organisms 24	Organisms 48	Organisms 72	Organisms 96	Temperature 0	Temperature 24	Temperature 48	Temperature 72	Temperature 96	Dissolved Oxygen 0	Dissolved Oxygen 24	Dissolved Oxygen 48	Dissolved Oxygen 72	Dissolved Oxygen 96	pH 0	pH 24	pH 48	pH 72	pH 96	Conductivity 0	Conductivity 24	Conductivity 48	Conductivity 72	Conductivity 96
Control	1		8	8	8			25.1	23.8 / 25.0	23.6			7.7	8.4 / 7.9	8.0			7.4	7.4 / 7.6				202	214 / 300			
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
12	1		8	8	7			25.1	23.8 / 25.0	23.3			7.7	7.9 / 7.9	7.9			7.4	7.9 / 7.9	7.0			219	229 / 314	323		
	2		8	7	6																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						

Chemistry Tech

prerenewal/postrenewal

EOW EOW EOW EOW EOW EOW EOW EOW EOW EOW

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2

Project# X16879

Client Camden

Sample Description 002

Technician:

Time:

Temperature (°C): 0hour 25.0 24hour 25.0 48hour 25.3 72hour ____ 96hour ____

Test started: Date 11/28/18 Time 1610

Test ended: Date 11/30/18 Time 1523

Test Species P. promelas ID# 111518 BA

0hour 1610 24hour 1515 48hour 1523 72hour ____ 96hour ____

Test Dilution	Rep	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
%		n/a																									
16	1		8	8	8			25.1	23.7 / 25.1	23.4			7.5	7.9 / 7.9	7.6			7.3	7.9 / 7.9	7.0			218	220 / 216	226		
	2		8	6	5																						
	3		8	6	6																						
	4		8	8	8																						
	5		8	8	8																						
21	1		8	8	8			25.1	23.7 / 25.1	23.4			7.6	7.9 / 7.9	7.8			7.3	7.9 / 7.9	7.1			220	222 / 223	233		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						

Chemistry Tech
pretenewal/postrenewal

EDM EDM EDM EDM EDM EDM EDM EDM EDM EDM

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2

Project# X6879

Client Camden

Sample Description 002

Technician:

Time:

Temperature (°C):

Test started: Date 11/28/18 Time 1610

Test ended: Date 11/30/18 Time 1523

Test Species P. promelas TD#111518BAC

	0hour	24hour	48hour	72hour	96hour
Technician:	BD	BD	EOW		
Time:	1610	1515	1523		
Temperature (°C):	25.0	25.2	25.3		

Test Dilution	Rep	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
%		n/a																									
28	1		8	8	8			25.1	25.3	25.4			7.6	7.4	7.6			7.3	7.1	7.1			225	252	242		
	2		8	7	7																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
37	1		8	8	8			25.1	25.3	25.4			7.7	7.9	7.7			7.3	7.1	7.1			236	240	254		
	2		8	8	8																						
	3		8	7	7																						
	4		8	7	7																						
	5		8	8	8																						

Chemistry Tech

pretenewal/postrenewal

EOW EOW EOW EOW EOW EOW EOW EOW EOW EOW

X6879

Test: AC-Acute Fish Test	Test ID: CMDNPPA
Species: PP-Pimephales promelas	Protocol: EPAAW02-EPA/821/R-02-012
Sample ID: AR0022365	Sample Type: EFF2-Industrial
Start Date: End Date:	Lab ID: ADEQ880630

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
1	27	2	37						
2	29	4	37						
3	28	3	37						
4	30	5	37						
5	19	4	21						
6	25	5	28						
7	22	2	28						
8	5	5	D-Control						
9	16	1	21						
10	23	3	28						
11	15	5	16						
12	11	1	16						
13	4	4	D-Control						
14	18	3	21						
15	3	3	D-Control						
16	20	5	21						
17	14	4	16						
18	9	4	12						
19	8	3	12						
20	17	2	21						
21	7	2	12						
22	13	3	16						
23	1	1	D-Control						
24	24	4	28						
25	26	1	37						
26	6	1	12						
27	12	2	16						
28	10	5	12						
29	21	1	28						
30	2	2	D-Control						

Comments:

APPENDIX C
STATISTICAL ANALYSES

Daphnid Acute Test-48 Hr Survival

Start Date:	11/28/2018	Test ID:	X6879DP	Sample ID:	AR0022365
End Date:	11/30/2018	Lab ID:	ADEQ880630	Sample Type:	EFF1-POTW
Sample Date:	11/28/2018	Protocol:	EPAAW02-EPA/821/R-02-01	Test Species:	DP-Daphnia pulex

Comments:

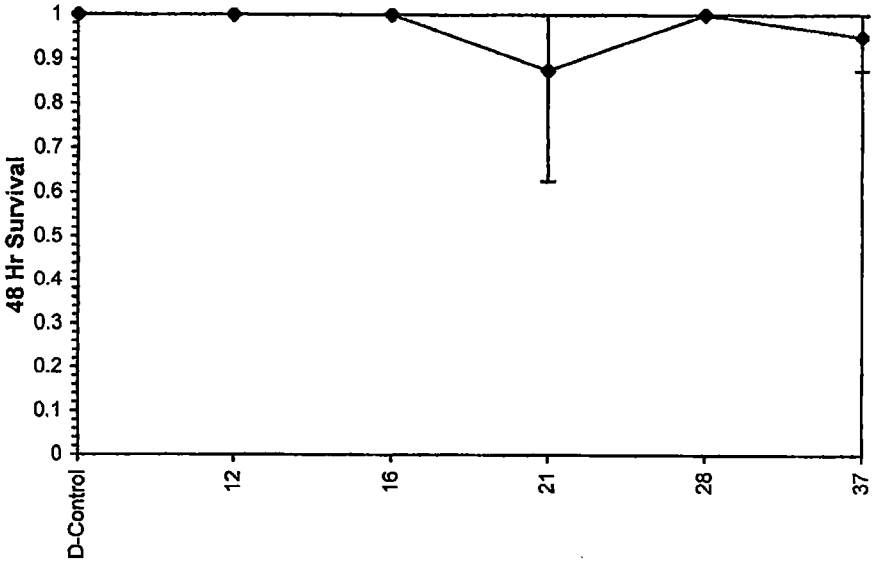
Conc-%	1	2	3	4	5
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000
12	1.0000	1.0000	1.0000	1.0000	1.0000
16	1.0000	1.0000	1.0000	1.0000	1.0000
21	1.0000	0.6250	0.7500	1.0000	1.0000
28	1.0000	1.0000	1.0000	1.0000	1.0000
37	1.0000	1.0000	0.8750	0.8750	1.0000

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
D-Control	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5		
12	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5	27.50	16.00
16	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5	27.50	16.00
21	0.8750	0.8750	1.2276	0.9117	1.3931	18.862	5	22.50	16.00
28	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5	27.50	16.00
37	0.9500	0.9500	1.3196	1.2094	1.3931	7.623	5	22.50	16.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.76044	0.927	-1.134	4.154
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	37	>37		2.7027
Treatments vs D-Control				

Dose-Response Plot



ToxCalc v5.0.23

Reviewed by: EAB 12/24/18

Test: DA-Daphnid Acute Test — Test ID: X6879DP
Species: DP-Daphnia pulex — Protocol: EPAAW02-EPA/821/R-02-012
Sample ID: AR0022365 — Sample Type: EFF1-POTW
Start Date: 11/28/2018 — End Date: 11/30/2018 — Lab ID: ADEQ880630

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	D-Control	8	8	8			
	2	2	D-Control	8	8	8			
	3	3	D-Control	8	8	8			
	4	4	D-Control	8	8	8			
	5	5	D-Control	8	8	8			
	6	1	12	8	8	8			
	7	2	12	8	8	8			
	8	3	12	8	8	8			
	9	4	12	8	8	8			
	10	5	12	8	8	8			
	11	1	16	8	8	8			
	12	2	16	8	8	8			
	13	3	16	8	8	8			
	14	4	16	8	8	8			
	15	5	16	8	8	8			
	16	1	21	8	8	8			
	17	2	21	8	6	5			
	18	3	21	8	6	6			
	19	4	21	8	8	8			
	20	5	21	8	8	8			
	21	1	28	8	8	8			
	22	2	28	8	8	8			
	23	3	28	8	8	8			
	24	4	28	8	8	8			
	25	5	28	8	8	8			
	26	1	37	8	8	8			
	27	2	37	8	8	8			
	28	3	37	8	7	7			
	29	4	37	8	7	7			
	30	5	37	8	8	8			

Comments:

Reviewed by: EVB 12/4/18

Acute Fish Test-48 Hr Survival

Start Date:	11/28/2018	Test ID:	X6879PP	Sample ID:	AR0022365
End Date:	11/30/2018	Lab ID:	ADEQ880630	Sample Type:	EFF1-POTW
Sample Date:	11/28/2018	Protocol:	EPAAW02-EPA/821/R-02-01	Test Species:	PP-Pimephales promelas
Comments:					

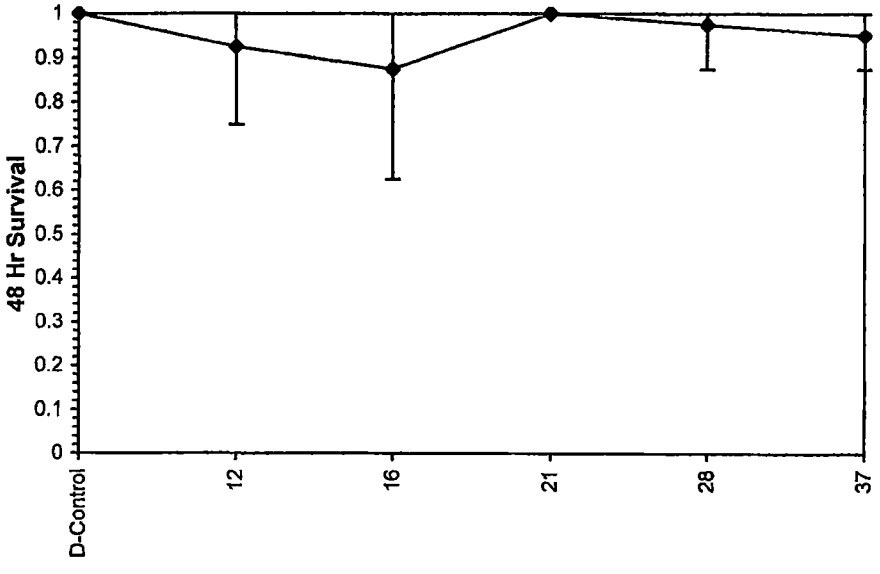
Conc-%	1	2	3	4	5
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000
12	0.8750	0.7500	1.0000	1.0000	1.0000
16	1.0000	0.6250	0.7500	1.0000	1.0000
21	1.0000	1.0000	1.0000	1.0000	1.0000
28	1.0000	0.8750	1.0000	1.0000	1.0000
37	1.0000	1.0000	0.8750	0.8750	1.0000

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
D-Control	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5		
12	0.9250	0.9250	1.2872	1.0472	1.3931	12.116	5	22.50	16.00
16	0.8750	0.8750	1.2276	0.9117	1.3931	18.862	5	22.50	16.00
21	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5	27.50	16.00
28	0.9750	0.9750	1.3564	1.2094	1.3931	6.055	5	25.00	16.00
37	0.9500	0.9500	1.3196	1.2094	1.3931	7.623	5	22.50	16.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.9091	0.927	-0.9636	1.09156
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	37	>37		2.7027
Treatments vs D-Control				

Dose-Response Plot



EPW

Reviewed by: 12/13/18
EOB 12/14/18

Test: AC-Acute Fish Test — Test ID: X6879PP
Species: PP-Pimephales promelas — Protocol: EPAAW02-EPA/821/R-02-012
Sample ID: AR0022365 — Sample Type: EFF1-POTW
Start Date: 11/28/2018 — End Date: 11/30/2018 — Lab ID: ADEQ880630

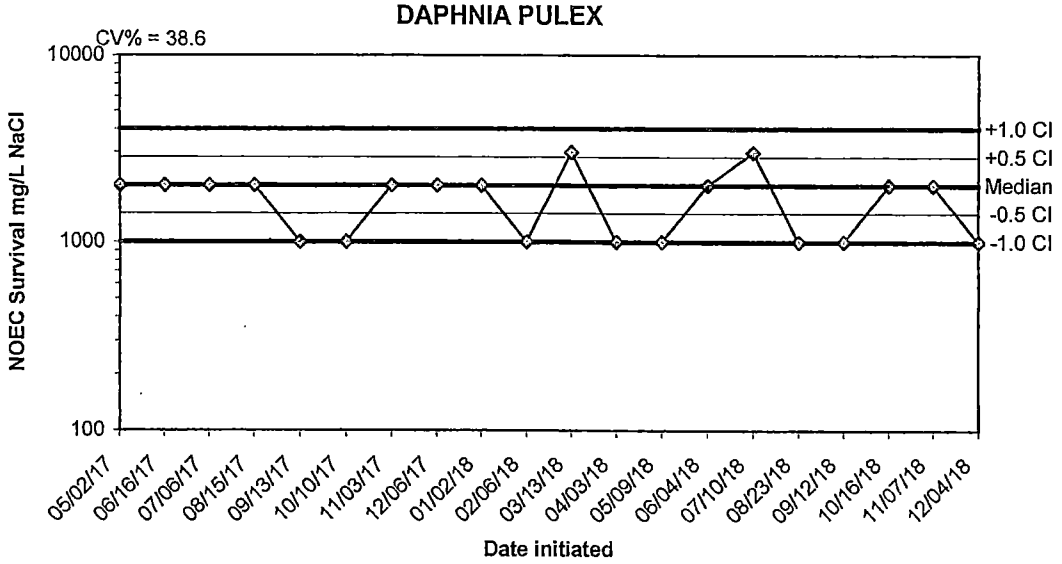
Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	D-Control	8	8	8			
	2	2	D-Control	8	8	8			
	3	3	D-Control	8	8	8			
	4	4	D-Control	8	8	8			
	5	5	D-Control	8	8	8			
	6	1	12	8	8	7			
	7	2	12	8	7	6			
	8	3	12	8	8	8			
	9	4	12	8	8	8			
	10	5	12	8	8	8			
	11	1	16	8	8	8			
	12	2	16	8	6	5			
	13	3	16	8	6	6			
	14	4	16	8	8	8			
	15	5	16	8	8	8			
	16	1	21	8	8	8			
	17	2	21	8	8	8			
	18	3	21	8	8	8			
	19	4	21	8	8	8			
	20	5	21	8	8	8			
	21	1	28	8	8	8			
	22	2	28	8	7	7			
	23	3	28	8	8	8			
	24	4	28	8	8	8			
	25	5	28	8	8	8			
	26	1	37	8	8	8			
	27	2	37	8	8	8			
	28	3	37	8	7	7			
	29	4	37	8	7	7			
	30	5	37	8	8	8			

Comments:

Reviewed by: EPW 12/13/18
EGB 12/14/18

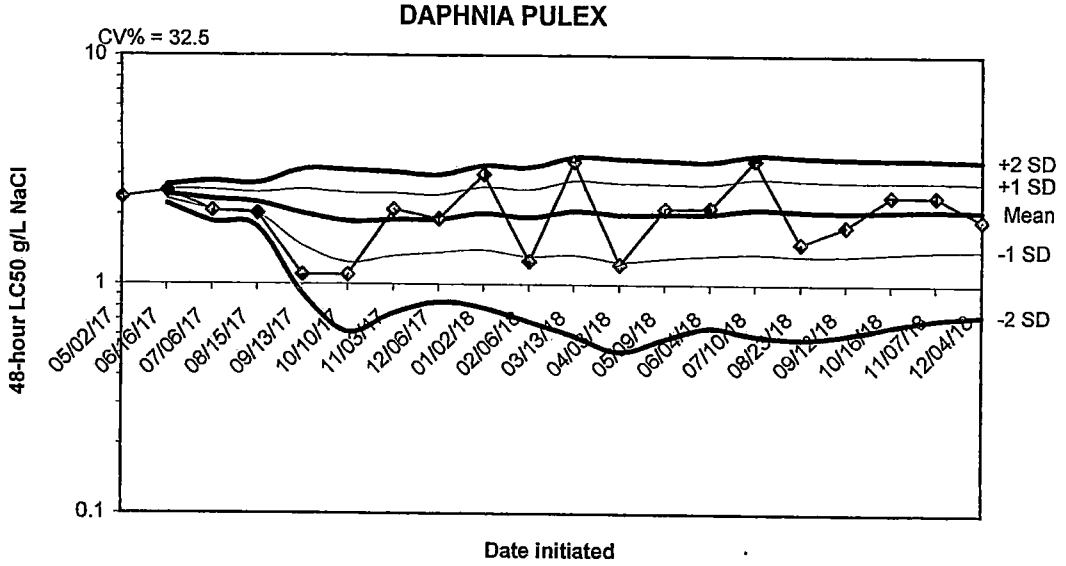
APPENDIX D
QUALITY ASSURANCE CHARTS

2018 48-HOUR ACUTE REFERENCE TOXICANT TEST DATA USING DAPHNIA PULEX



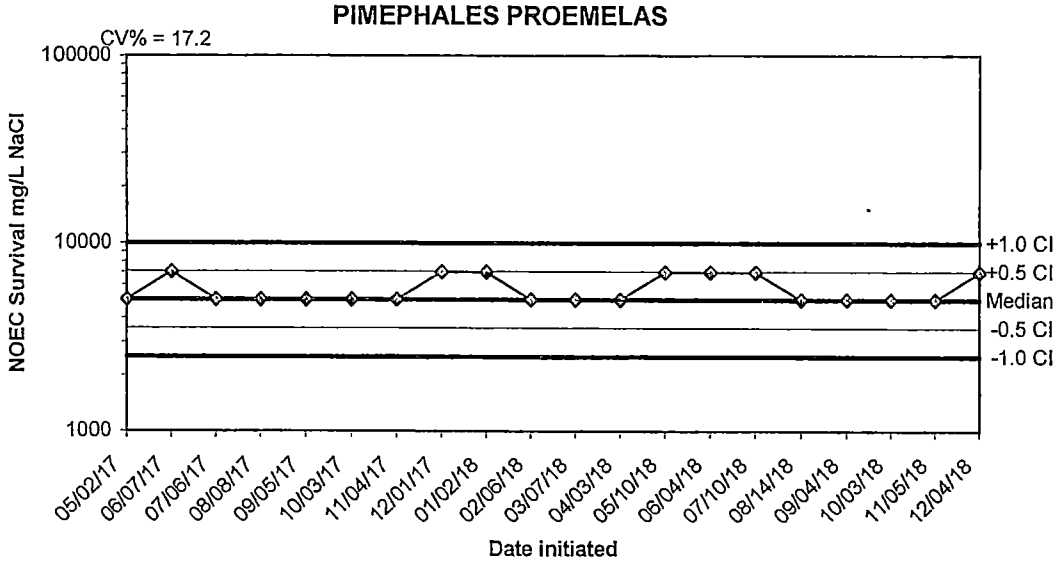
Dates	Values	Median	-0.5 CI	-1.0 CI	+0.5 CI	+1.0 CI
05/02/17	2000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
06/16/17	2000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
07/06/17	2000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
08/15/17	2000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
09/13/17	1000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
10/10/17	1000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
11/03/17	2000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
12/06/17	2000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
01/02/18	2000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
02/06/18	1000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
03/13/18	3000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
04/03/18	1000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
05/09/18	1000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
06/04/18	2000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
07/10/18	3000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
08/23/18	1000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
09/12/18	1000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
10/16/18	2000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
11/07/18	2000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
12/04/18	1000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000

2018 48-HOUR ACUTE REFERENCE TOXICANT TEST DATA USING DAPHNIA PULEX



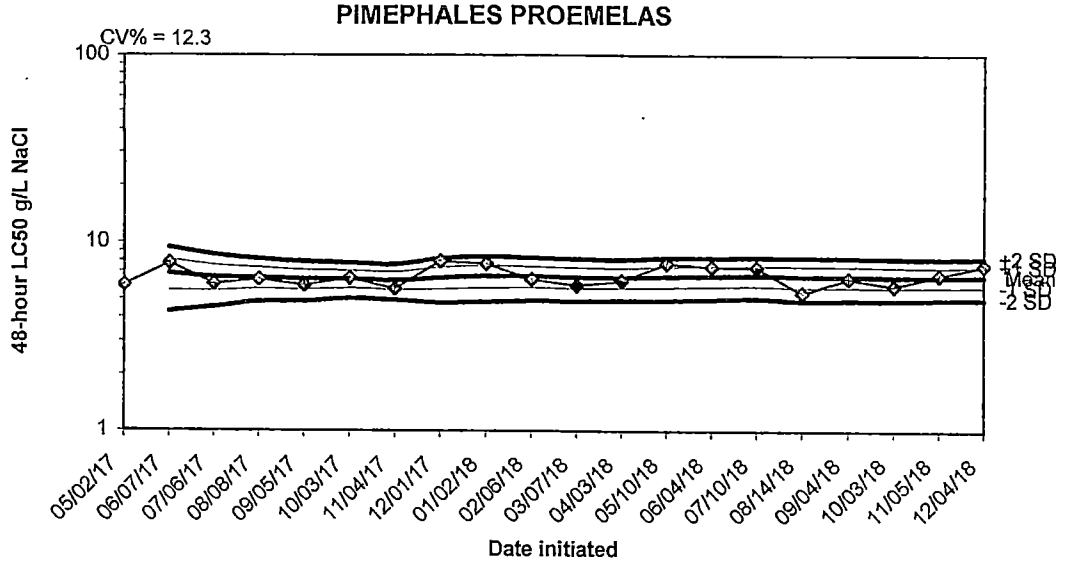
Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
05/02/17	2.3750					
06/16/17	2.5400	2.4575	2.3408	2.2242	2.5742	2.6908
07/06/17	2.0800	2.3317	2.0986	1.8656	2.5647	2.7977
08/15/17	2.0300	2.2563	2.0134	1.7706	2.4991	2.7419
09/13/17	1.1000	2.0250	1.4668	0.9086	2.5832	3.1414
10/10/17	1.0991	1.8707	1.2445	0.6182	2.4969	3.1231
11/03/17	2.1100	1.9049	1.3261	0.7473	2.4836	3.0624
12/06/17	1.9200	1.9068	1.3709	0.8350	2.4426	2.9785
01/02/18	3.0000	2.0282	1.4085	0.7888	2.6480	3.2677
02/06/18	1.2600	1.9514	1.3186	0.6859	2.5842	3.2170
03/13/18	3.4000	2.0831	1.3407	0.5983	2.8255	3.5679
04/03/18	1.2200	2.0112	1.2608	0.5104	2.7616	3.5120
05/09/18	2.1300	2.0203	1.3011	0.5819	2.7395	3.4587
06/04/18	2.1500	2.0296	1.3377	0.6458	2.7214	3.4133
07/10/18	3.4600	2.1249	1.3628	0.6006	2.8871	3.6493
08/23/18	1.5100	2.0865	1.3343	0.5821	2.8387	3.5909
09/12/18	1.7900	2.0691	1.3372	0.6054	2.8009	3.5328
10/16/18	2.4200	2.0886	1.3738	0.6590	2.8034	3.5182
11/07/18	2.4200	2.1060	1.4072	0.7084	2.8048	3.5036
12/04/18	1.9100	2.0962	1.4146	0.7330	2.7778	3.4594

2018 48-HOUR ACUTE REFERENCE TOXICANT TEST DATA USING PIMEPHALES PROEMELAS



Dates	Values	Median	-0.5 CI	-1.0 CI	+0.5 CI	+1.0 CI
05/02/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
06/07/17	7000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
07/06/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
08/08/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
09/05/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
10/03/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
11/04/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
12/01/17	7000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
01/02/18	7000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
02/06/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
03/07/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
04/03/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
05/10/18	7000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
06/04/18	7000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
07/10/18	7000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
08/14/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
09/04/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
10/03/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
11/05/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
12/04/18	7000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000

2018 48-HOUR ACUTE REFERENCE TOXICANT TEST DATA USING PIMEPHALES PROEMELAS



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
05/02/17	5.9200					
06/07/17	7.7100	6.8150	5.5493	4.2836	8.0807	9.3464
07/06/17	6.0000	6.5433	5.5322	4.5210	7.5545	8.5656
08/08/17	6.3700	6.5000	5.6699	4.8397	7.3301	8.1603
09/05/17	5.9200	6.3840	5.6197	4.8554	7.1483	7.9126
10/03/17	6.4600	6.3967	5.7124	5.0281	7.0810	7.7653
11/04/17	5.6700	6.2929	5.6105	4.9281	6.9752	7.6576
12/01/17	7.9400	6.4988	5.6395	4.7803	7.3580	8.2172
01/02/18	7.7100	6.6333	5.7339	4.8344	7.5328	8.4322
02/06/18	6.3700	6.6070	5.7549	4.9028	7.4591	8.3112
03/07/18	5.9200	6.5445	5.7101	4.8756	7.3790	8.2135
04/03/18	6.2400	6.5192	5.7187	4.9182	7.3196	8.1201
05/10/18	7.7600	6.6146	5.7745	4.9344	7.4547	8.2949
06/04/18	7.4600	6.6750	5.8368	4.9986	7.5132	8.3514
07/10/18	7.4000	6.7233	5.8942	5.0651	7.5524	8.3816
08/14/18	5.4000	6.6406	5.7740	4.9074	7.5073	8.3739
09/04/18	6.4600	6.6300	5.7897	4.9495	7.4703	8.3105
10/03/18	5.9200	6.5906	5.7584	4.9262	7.4227	8.2549
11/05/18	6.7500	6.5989	5.7894	4.9799	7.4085	8.2180
12/04/18	7.6000	6.6490	5.8299	5.0107	7.4681	8.2873

APPENDIX E
AGENCY FORMS

Acute Forms
Daphnia pulex Survival

Permittee: Camden Water Utilities
NPDES Permit Number: AR0022365/AFIN 52-00073
Composite Collected **From: 11/26/18** **To: 11/27/18**
From: 11/27/18 **To: 11/28/18**
Test Initiated: 11/28/18
Dilution Water Used: **Receiving Water** **X Reconstituted Water**

Dilution Series Results - Percent Survival

TIME OF READING	REP	0	12.0	16.0	21.0	28.0	37.0
24-hour	A	100.0	100.0	100.0	100.0	100.0	100.0
	B	100.0	100.0	100.0	75.0	100.0	100.0
	C	100.0	100.0	100.0	75.0	100.0	87.5
	D	100.0	100.0	100.0	100.0	100.0	87.5
	E	100.0	100.0	100.0	100.0	100.0	100.0
48-hour	A	100.0	100.0	100.0	100.0	100.0	100.0
	B	100.0	100.0	100.0	62.5	100.0	100.0
	C	100.0	100.0	100.0	75.0	100.0	87.5
	D	100.0	100.0	100.0	100.0	100.0	87.5
	E	100.0	100.0	100.0	100.0	100.0	100.0
	Mean	100.0	100.0	100.0	87.5	100.0	95.0

1. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate: Is the mean survival at 48 hours significantly different (p=.05) than the control survival for the % effluent corresponding to:
a.) LOW FLOW OR CRITICAL DILUTION (28.0%) **YES** **X** **NO**
b.)½ LOW FLOW OR 2X CRITICAL DILUTION (N/A%) **YES** **NO**
2. Enter percent effluent corresponding to the LC_{50} below:
LC_{50} = >37.0% effluent
95 % confidence limits: N/A
Method of LC_{50} calculation: N/A
3. If you answered NO to 1.a) enter (P) otherwise enter (F): P
4. Enter response to item 3 on DMR Form, parameter TEM3D
5. If you answered NO to 1.b) enter (P) otherwise enter (F): N/A
6. Enter response to item 5 on DMR Form, parameter TFM3D

Biomonitoring
Daphnia pulex 48 hour Acute Static Renewal
Chemical Parameters Chart*

Permittee: Camden Water Utilities
NPDES Number: AR0022365/AFIN 52-00073
Contact: Keith Ballard
Analyst: Ware, Morado, Jones
Sample Collected **From:** **Date 11/26/18** **Time 0800**
To: **Date 11/27/18** **Time 0800**
Test Begin **Date 11/28/18** **Time 1540**
Test End **Date 11/30/18** **Time 1445**

Parameter	D.O.			Temperature			Alkalinity			Hardness			pH		
Dilut./Time	0hrs.	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs
0.0	7.7	7.9	8.0	25.0	25.2	25.3	32.0			44.0			7.4	7.6	7.0
12.0	7.7	7.9	7.9	25.0	25.2	25.3							7.4	7.4	7.0
16.0	7.5	7.9	7.6	25.0	25.2	25.3							7.3	7.4	7.0
21.0	7.6	7.9	7.8	25.0	25.2	25.3							7.3	7.3	7.1
28.0	7.6	7.8	7.8	25.0	25.2	25.3							7.3	7.3	7.1
37.0	7.7	7.8	7.7	25.0	25.2	25.3	12.0	16.0		40.0	40.0		7.3	7.2	7.1

*This Form is to be submitted with each DMR.
Alkalinity and hardness to be reported as mg/l $CaCO_3$ on 100% effluent.

Acute Forms
Pimephales promelas Survival

Permittee: Camden Water Utilities
NPDES Permit Number: AR0022365/AFIN 52-00073
Composite Collected **From: 11/26/18** **To: 11/27/18**
From: 11/27/18 **To: 11/28/18**
Test Initiated: 11/28/18
Dilution Water Used: **Receiving Water** **X Reconstituted Water**

Dilution Series Results - Percent Survival

TIME OF READING	REP	0	12.0	16.0	21.0	28.0	37.0
24-hour	A	100.0	100.0	100.0	100.0	100.0	100.0
	B	100.0	87.5	75.0	100.0	87.5	100.0
	C	100.0	100.0	75.0	100.0	100.0	87.5
	D	100.0	100.0	100.0	100.0	100.0	87.5
	E	100.0	100.0	100.0	100.0	100.0	100.0
48-hour	A	100.0	87.5	100.0	100.0	100.0	100.0
	B	100.0	75.0	62.5	100.0	87.5	100.0
	C	100.0	100.0	75.0	100.0	100.0	87.5
	D	100.0	100.0	100.0	100.0	100.0	87.5
	E	100.0	100.0	100.0	100.0	100.0	100.0
	Mean	100.0	92.5	87.5	100.0	97.5	95.0

1. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate: Is the mean survival at 48 hours significantly different (p=.05) than the control survival for the % effluent corresponding to:
a.) LOW FLOW OR CRITICAL DILUTION (28.0%) **YES** **X** **NO**
b.)½ LOW FLOW OR 2X CRITICAL DILUTION (N/A%) **YES** **NO**
2. Enter percent effluent corresponding to the LC_{50} below:
LC_{50} = >37.0% effluent
95 % confidence limits: N/A
Method of LC_{50} calculation: N/A
3. If you answered NO to 1.a) enter (P) otherwise enter (F): P
4. Enter response to item 3 on DMR Form, parameter TEM3D
5. If you answered NO to 1.b) enter (P) otherwise enter (F): N/A
6. Enter response to item 5 on DMR Form, parameter TFM3D

Biomonitoring
Pimephales promelas 48 hour Acute Static Renewal
Chemical Parameters Chart*

Permittee: Camden Water Utilities
NPDES Number: AR0022365/AFIN 52-00073
Contact: Keith Ballard
Analyst: Ware, Morado, Jones

Sample Collected	**From:**	**Date 11/26/18**	**Time 0800**
	To:	**Date 11/27/18**	**Time 0800**
Test Begin		**Date 11/28/18**	**Time 1610**
Test End		**Date 11/30/18**	**Time 1523**

Parameter	D.O.			Temperature			Alkalinity			Hardness			pH		
Dilut./Time	0hrs.	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs
0.0	7.7	7.9	8.0	25.0	25.2	25.3	32.0			44.0			7.4	7.6	7.0
12.0	7.7	7.9	7.9	25.0	25.2	25.3							7.4	7.4	7.0
16.0	7.5	7.9	7.6	25.0	25.2	25.3							7.3	7.4	7.0
21.0	7.6	7.9	7.8	25.0	25.2	25.3							7.3	7.3	7.1
28.0	7.6	7.8	7.6	25.0	25.2	25.3							7.3	7.3	7.1
37.0	7.7	7.8	7.7	25.0	25.2	25.3	12.0	16.0		40.0	40.0		7.3	7.2	7.1

*This Form is to be submitted with each DMR.
Alkalinity and hardness to be reported as mg/l $CaCO_3$ on 100% effluent.

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: Camden Water Utilities

Project#: X6879

Chain of Custody Documents Checked by: [signature] 12/14/18
Technician/Date

Raw Data Documents Checked by: [signature] 12/14/18
Technician/Date

Statistical Analysis Package Checked by: EGB 12/24/18
Quality Manager/Date

Quality Control Data Checked by: EGB 12/24/18
Quality Manager/Date

Report Checked by: EGB 12/26/18
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.

Erin L. Briggs, BS
Quality Manager

12/26/18
Date

Report Rev. 3.0

Bio-Analytical Laboratories (BAL)
ADEQ #880630
Project X6996

Bio-Analytical Laboratories' Executive Summary

Permittee: Camden Water Utilities
P.O. Box J
Camden, AR 71711
Project #: X6996
Outfall: 002 (treated sanitary wastewater)
Permit #: AR0022365/ AFIN 52-00073
Contact: Mr. Keith Ballard
Test Dates: March 20 - 22, 2019
Test Type: 48-hour Acute Definitive Toxicity Test using *Pimephales promelas*- (EPA Method 2000.0)
48-hour Acute Definitive Toxicity Test using *Daphnia pulex* (EPA Method 2021.0)

Results:

For *Daphnia pulex:*
1. If the NOEC for survival is less than the critical dilution (28.0%), enter a "1"; otherwise, enter a "0" for Parameter No. TEM3D - 0 **(Pass).**
2. Report the NOEC value for survival, Parameter No. TOM3D - 37.0%.
3. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQM3D- 7.62%.

For *Pimephales promelas:*
1. If the NOEC for survival is less than the critical dilution (28.0%), enter a "1"; otherwise, enter a "0" for Parameter No. TEM6C - 0 **(Pass).**
2. Report the NOEC value for survival, Parameter No. TOM6C - 37.0%.
3. Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQM6C - 7.62%.

This report contains a total of 37 pages, including this page. The information within pertains only to the samples listed in the chain of custody documents. The results comply with the 2009 TNI standard. The chemical data recorded in this report are for monitoring purposes only and should not be reported on discharge monitoring reports.

Bio-Analytical Laboratories

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THE RESULTS OF TWO 48-HOUR ACUTE DEFINITIVE TOXICITY TESTS FOR OUTFALL 002 AT

CAMDEN WATER UTILITIES
Camden, Arkansas

NPDES #AR0022365
AFIN #52-00073

EPA Methods 2000.0 and 2021.0

Project X6996

Test Dates: March 20 - 22, 2019

Report Date: April 4, 2019

Prepared for:
Mr. Keith Ballard
Camden Water Utilities
P.O. Box J
Camden, AR 71711

Prepared by:
Ginger Briggs
Bio-Analytical Laboratories
P.O. Box 527
Doyline, LA 71023
ADEQ #880630

BAL
ADEQ #880630
Project X6996

TABLE OF CONTENTS

1.0 Introduction	4
2.0 Methods and Materials	4
2.1 Test Methods	4
2.2 Test Organisms	4
2.3 Dilution Water	4
2.4 Test Concentrations	5
2.5 Sample Collection	5
2.6 Sample Preparation	5
2.7 Monitoring of the Tests	5
2.8 Data Analysis	5
3.0 Results and Discussion	6
4.0 Conclusions	7
5.0 References	8
Appendices	
A- Chain-of-Custody Documents	9
B- Raw Data Sheets	11
C- Statistical Analyses	21
D- Quality Assurance Charts	26
E - Agency Forms	31
F- Report Quality Assurance Form	36

BAL
ADEQ #880630
Project X6996

1.0 Introduction

Bio-Analytical Laboratories (BAL), Doyline, Louisiana conducted two 48-hour acute definitive toxicity tests for Outfall 002 at the wastewater treatment plant operated by Camden Water Utilities, Camden, Arkansas . Such testing will determine compliance with the Water Quality Standard, of greater than 50 percent survival of the appropriate test organism in the defined low-flow effluent concentration (critical dilution) for a 48-hour period. The test organisms used were the cladoceran, *Daphnia pulex* and the fathead minnow, *Pimephales promelas.* The test endpoints are the No-Observed-Effect-Concentration (NOEC), which is defined as the highest effluent concentration that is not statistically different from the control, and the Lethal Concentration (LC_{50}), which is the effluent concentration at which 50 percent of the test organisms die.

2.0 Methods and Materials

2.1 Test Methods

All methods followed were according to the latest edition of "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms" (EPA-821-R-02-012), "Standard Methods (SM) for The Examination of Water and Wastewater. 20th Edition" (APHA 1998. Each chemical method listed in the report as SM 1997) and BAL's standard operating procedure.

2.2 Test Organisms

The *Daphnia pulex* test organisms were cultured in-house at test temperature and were less than 24 hours old at test initiation. The fathead minnows were also raised in-house at test temperature and were approximately 6 days old at test initiation. The minnows were acclimated to dilution water hardness prior to test initiation. Reference toxicant tests were conducted a minimum of once monthly in order to document organism sensitivity.

2.3 Dilution Water

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

2.4 Test Concentrations

The test concentrations used in the acute toxicity tests were 37.0, 28.0, 21.0, 16.0 and 12.0 percent effluent and a control. The critical dilution was defined as 28.0 percent effluent. The tests were conducted using 5 replicates of 8 animals each for a total of 40 animals per concentration.

2.5 Sample Collection

Two 24-hour composite samples of Outfall 002 were collected by Camden Water Utilities personnel on March 19 and 20, 2019, at 0800 hours. Upon completion of collection, the samples were packed in ice and delivered to Bio-Analytical Laboratories by BAL personnel. The temperature upon arrival was 1.1^0 Celsius.

2.6 Sample Preparation

Upon arrival, the samples were logged in, given an identification number and refrigerated unless needed. Prior to use, each sample was warmed to 25 ± 1^0 Celsius. Total residual chlorine levels (SM 4500-Cl E) were measured in milligrams/Liter (mg/L) with a Capital Controls^R amperometric titrator and recorded if present. Total ammonia levels were measured in mg/L using a test strip. Dissolved oxygen (SM 4500-O G), pH (SM 4500-H+ B) and conductivity (SM 2510 B) measurements, in mg/L, standard units and umhos/cm, respectively, were taken on the control and each test concentration at test initiation, at test renewal and at test termination. Alkalinity (SM 2320B) and hardness (SM 2340 C) levels were measured in mg/L as $CaCO_3$ on the control and the highest effluent concentration.

2.7 Monitoring of the Tests

The tests were run in a Precision^R dual programmable illuminated incubator set at a temperature of 25 ± 1^0 Celsius. An AEMC^R data logger was used to monitor diurnal temperature throughout the testing period. Light cycle and intensity were recorded twice a month.

2.8 Data Analysis

Survival data was analyzed using the ToxCalc v5.0.23 statistical program to obtain the No- Observed- Effect- Concentration (NOEC) values. The LC_{50} values were also obtained using the ToxCalc program.

BAL
ADEQ #880630
Project X6996

3.0 Results and Discussion

The results of the definitive tests can be found in Table 1. The mean survival in the 28.0 percent critical dilution was greater than 50 percent after 48 hours of exposure in both tests. The NOEC value for the *Daphnia pulex* and the fathead minnow test was 37.0 percent effluent (p.= .05). The 48-hour LC_{50} value for the *Daphnia pulex* and fathead minnow test was >37.0 percent effluent (p=.05). There was a significant difference noted in the 21.0 percent effluent concentration in the *Daphnia pulex* test; however, this was determined to be an anomaly and not an indication of a true dose response.

Table 1: Results of the 48-hour Acute Definitive Toxicity Tests

Percent Effluent	Percent Survival	
Test Organism	*D. pulex*	*P.promelas*
Control	95.0	95.0
12.0	95.0	97.5
16.0	85.0	92.5
21.0	72.5	97.5
28.0	95.0	97.5
37.0	80.0	95.0

The reference toxicant test results indicate that the test organisms were within the respective sensitivity range. The graphs of the results of the acute reference toxicant tests can be found in Appendix D- Quality Assurance Charts.

BAL
ADEQ #880630
Project X6996

4.0 Conclusions

The two composite samples of Outfall 002 collected from Camden Water Utilities' wastewater treatment plant on March 19 and 20, 2019, were not found to be lethally toxic to the *Daphnia pulex* test organisms nor the *Pimephales promelas* test organisms in the 28.0 percent critical dilution after 48 hours of exposure (p=.05).

BAL
ADEQ #880630
Project X6996

5.0 References

EPA, 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. EPA-821-R-02-012, 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
Doyline, LA 71023
(318) 745-2772
1-800-259-1246
Fax (318) 745-2773

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

Laboratory Use Only:

Company: Camden Water Utilities	Phone: (870) 836-4329	Analysis:							Lab Control Number:	Project Number: X6996 Temp. upon arrival: 1.2 Therm#: 29 Color: tan Odor: none Tech: EoW Preservative: (below)
Address: P.O. Box J, Camden, AR 71711	Fax: (870) 836-5190	Chronic Ceriodaphnia	Chronic minnow	Acute minnow(fresh/marine)	Acute Daphnia species	Acute Mysid	Acute Ceriodaphnia	Fecal Coliform		
Permit #: AR0022365/ AFIN 52-00073	Purchase Order:									
Sampler's Signature/Printed Name/Affiliation:										

Date Start / Date End	Time Start / Time End	C	G	# and type of container	Sample Identification									
3-18-19 / 3-19-19	8:00 Am / 8:00 Am	X		2 half gallons	002- Day 1			X	X				67127	
3-19-19 / 3-20-19	8:00 Am / 8:00	X		2 half gallons	002- Day 2			X	X				67128	

Relinquished by/Affiliation:	Date:	Time:	Received by/Affiliation:	Date:	Time:
Annette Strickland	3-19-19	1620		3-20-19	1020
Relinquished by/Affiliation:	Date:	Time:	Received by/Affiliation:	Date:	Time:
Relinquished by/Affiliation:	Date:	Time:	Received by/Affiliation:	Date:	Time:
	3-20-19	1300	Emily Mare	3/20/19	1300

Method of Shipment: ✓ Lab ____ Bus ____ Fed Ex ____ DHL ____ UPS ____ Client ____ Other Tracking #_____

Comments:

COC Rev. 3.1

APPENDIX B
RAW DATA SHEETS

BIO-ANALYTICAL LABORATORIES
ACUTE TOXICITY TEST WATER QUALITY DATA

Project# X6996

Client: CMDN/Camden Water Utilities

Address: P.O. Box J, Camden, AR 71711

NPDES#AR0022365 Outfall 002

Technicians: EGB/LEM/EDW,BDJ

Test initiated: Date 3/20/19 Time 1400

Test terminated: Date 3/22/19 Time 1335

Dissolved Oxygen Meter: Model # YSI 550A Serial #06E2089 AV
pH Meter: Model #Orion 230A+ Serial #015253
Conductivity Meter: Model # Fisher Serial #130168768
Amperometric Titrator: Model #Fischer-Porter Serial #92W445766

Sample Information

Sample ID#	Initial D.O. (mg/L and %)	Aerate? Minutes/ Final D.O(mg/L &,%)	Total Residual Chlorine (mg/L)	Dechlorinated? Amount?	Ammonia (NH3) mg/L	Salinity	Hardness	Alkalinity	Tech
C17127	10.3/118.8	Y/6/8.7/99.9%	<0.01	NO	1.0	N/A	28.0	12.0	EDW
C17128	9.7/120.2%	Y/6/8.21 99.3%	↓	↓	↓	↓	32.0	24.0	EDW

Dilution Water Information

Dilution Water	ID#	Initial D.O (mg/L & %)	Aerate? Minutes/D.O (mg/L & %)	Total Residual Chlorine (mg/L)	Ammonia (NH3) mg/L	pH	Hardness	Alkalinity	Tech
Soft Rec	4404					7.1	52.0	36.0	EDW

Test Species Information

Test Species Info.	Species:D.pulex ID#: BAL34-18	Species:P.promelas ID#: BAL03/419	Species: ID#:	Species: ID#:
Age	< 24 hours	6 days		
Test Container Size	50 ml	250 ml		
Test volume	20 ml	200 ml		
Feeding: Type	YCT/Algae	Artemia		
Amount	>/= 2 hours prior to initiation	>/= 2 hours prior to initiation		
Aeration?	No	None		
Amount	↓	↓		
Condition of survivors	Fair BDJ 3/22/19	Good BDJ 3/22/19		

Comments:

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.

Project# X6996

Client Camden

Sample Description 002

Test started: Date 3/20/19 Time 1350

Test ended: Date 3/22/19 Time 1350

Test Species D. pulex ID# BATCH-48

Technician: Ohour EDM 24hour EDM 48hour BDJ 72hour ____ 96hour ____

Time: Ohour 1350 24hour 1233 48hour 1350 72hour ____ 96hour ____

Temperature (°C): Ohour 24.9 24hour 24.9 48hour 24.9 72hour ____ 96hour ____

Test Dilution %	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
0 soft	1	N/A	8	8	8			24.9	23.0 / 23.4	22.9			7.7	8.1 / 6.0	1.0			8.0	7.6 / 7.5	1.1			196	211 / 193	214		
	2		8	8	8																						
	3		8	8	7																						
	4		8	8	8																						
	5		8	8	7																						
12.1	1		8	8	8			24.9	23.0 / 23.9	23.1			7.6	7.8 / 8.0	8.0			7.9	7.5 / 7.4	7.1			196	202 / 196	218		
	2		8	8	8																						
	3		8	8	7																						
	4		8	8	8																						
	5		8	8	7																						
Chemistry Tech prerenewal/postrenewal								EDM	EDM / BDJ	BDJ			EDM	EDM / BDJ	BDJ			EDM	EDM / BDJ	BDJ			EDM	EDM / BDJ	BDJ		

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2)

Project# X6996

Client Camden

Sample Description 002

Test started: Date 3/20/19 Time 1350

Test ended: Date 3/22/19 Time 1350

Test Species D. pulex ID# BAL J4-L8

Technician: 0hour EDW 24hour EDW 48hour BDJ 72hour ______ 96hour ______

Time: 0hour 1350 24hour 1233 48hour 1350 72hour ______ 96hour ______

Temperature (°C): 0hour 24.9 24hour 24.9 48hour 24.9 72hour ______ 96hour ______

Test Dilution	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
%		N/A	0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
16%	1		8	8	7			24.6	23.5/24.0	23.1			7.1	7.8/8.0	7.9			7.8	7.5/7.4	7.1			193.5	215/194	214		
	2		8	8	8																						
	3		8	8	6																						
	4		8	8	7																						
	5		8	8	6																						
21%	1		8	8	4			24.6	23.5/24.1	23.1			7.8	7.8/8.0	7.9			7.8	7.4/7.4	7.1			193.7	216/194	213		
	2		8	8	4																						
	3		8	8	7																						
	4		8	8	6																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								EDW	EDW/BDJ	BDJ			EDW	EDW/BDJ	BDJ			EDW	EDW/BDJ	BDJ			EDW	EDW/BDJ	BDJ		

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2

Project# X6996

Client Camden

Sample Description 002

Test started: Date 3/20/19 Time 1350

Test ended: Date 3/22/19 Time 1350

Test Species D pulex ID# BAL J4-L8

Technician: 0hour EDW 24hour EDW 48hour BRJ 72hour ____ 96hour ____

Time: 0hour 1350 24hour 1233 48hour 1350 72hour ____ 96hour ____

Temperature (°C): 0hour 24.9 24hour 24.9 48hour 24.9 72hour ____ 96hour ____

Test Dilution %	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
28%	1	N/A	8	8	8			24.4	23.9/24.1	23.4			7.6	7.5/7.9	7.8			7.7	7.4/7.3	7.1			193.8	212/198	215		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	7																						
	5		8	8	7																						
37%	1		8	8	7			24.4	23.9/24.1	23.4			7.8	7.6/8.0	7.9			7.6	7.4/7.3	7.1			194.3	226/204	220		
	2		8	8	7																						
	3		8	8	7																						
	4		8	8	6																						
	5		8	8	5																						
Chemistry Tech prerenewal/postrenewal								EDW	EDW/BRJ	BRJ			EDW	EDW/BRJ	BRJ			EDW	EDW/BRJ	BRJ			EDW	EDW/BRJ	BRJ		

X6996

Test: DA-Daphnid Acute Test
Species: DP-Daphnia pulex
Sample ID: AR0022365
Start Date: End Date:

Test ID: CMDNDP
Protocol: EPAAW02-EPA/821/R-02-012
Sample Type: EFF1-POTW
Lab ID: ADEQ880630

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
1	2	2	D-Control						
2	24	4	28						
3	10	5	12						
4	5	5	D-Control						
5	16	1	21						
6	28	3	37						
7	11	1	16						
8	19	4	21						
9	1	1	D-Control						
10	4	4	D-Control						
11	27	2	37						
12	7	2	12						
13	21	1	28						
14	17	2	21						
15	22	2	28						
16	3	3	D-Control						
17	12	2	16						
18	30	5	37						
19	25	5	28						
20	13	3	16						
21	9	4	12						
22	26	1	37						
23	6	1	12						
24	18	3	21						
25	23	3	28						
26	15	5	16						
27	8	3	12						
28	14	4	16						
29	20	5	21						
30	29	4	37						

Comments:

ToxCalc 5.0

Reviewed by: BDS 3/18/19

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.

Project# X6996

Client Camden

Sample Description 002

Test started: Date 3/20/19 Time 1400

Test ended: Date 3/22/19 Time 1335

Test Species P. promelas ID# BAL031419

Technician: 0hour EDW 24hour BDJ 48hour BDJ 72hour ____ 96hour ____

Time: 0hour 1400 24hour 24.9 48hour 1335 72hour ____ 96hour ____

Temperature (°C): 0hour 24.9 24hour 1225 48hour 24.9 72hour ____ 96hour ____

Test Dilution %	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
		N/A	0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
0 soft	1		8	8	8			24.9	23.3/23.6	22.4			7.7	7.9/8.0	7.6			8.0	7.5/7.5	7.0			196	227/193	202		
	2		8	8	8																						
	3		8	8	7																						
	4		8	8	7																						
BD031819 12%	5		8	8	8																						
12.1.	1		8	8	8			24.9	23.3/23.9	22.9			7.6	7.9/8.0	7.8			7.9	7.5/7.4	7.0			196	204/196	204		
	2		8	8	7																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								EDW	BDJ/BDJ	BDJ			EDW	BDJ/BDJ	BDJ			EDW	BDJ/BDJ	BDJ			EDW	BDJ/BDJ	BDJ		

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.

Project# X6996

Client Camden

Sample Description 002

Test started: Date 3/20/19 Time 1400

Test ended: Date 3/22/19 Time 1335

Test Species P. promelas ID# BAL031419

Technician: Ohour Edn . 24hour BDJ 48hour BDJ 72hour _____ 96hour _____

Time: Ohour 1406 24hour 1225 48hour 1235 72hour _____ 96hour _____

Temperature (°C): Ohour 24.9 24hour 24.9 48hour 24.9 72hour _____ 96hour _____

Test Dilution %	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
		N/A																									
16%	1		8	8	7			24.6	23.3 / 24.0	22.8			7.1	7.9 / 8.0	7.7			7.8	7.4 / 7.4	7.0			193	202 / 196	205		
	2		8	8	7																						
	3		8	8	8																						
	4		8	8	7																						
	5		8	8	8																						
21%	1		8	8	7			24.6	23.3 / 24.1	22.7			7.8	7.9 / 8.0	7.7			7.8	7.3 / 7.4	7.0			193	200 / 196	203		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal								EDN / BDJ	BDJ				EDN / BDJ	BDJ	BDJ			EDN / BDJ	BDJ	BDJ			EDN / BDJ	BDJ	BDJ		

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.

Project# X6996

Client Camden

Sample Description 002

Test started: Date 3/20/19 Time 1400

Test ended: Date 3/22/19 Time 1335

Test Species P. promelas ID# BAL031419

Technician:	Ohour EDM	24hour BDJ	48hour BDJ	72hour	96hour
Time:	Ohour 1400	24hour 1225	48hour 1335	72hour	96hour
Temperature (°C):	Ohour 24.9	24hour 24.9	48hour 24.9	72hour	96hour

Test Dilution %	Rep.	Test Salinity	# Live Organisms					Temperature					Dissolved Oxygen					pH					Conductivity				
			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
		N/A																									
28.1.	1		8	8	8			24.4	23.1/24.1	22.6			7.6	7.9/7.9	7.7			7.7	7.3/7.3	7.0			1938	203/208	207		
	2		8	8	7																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
37.1.	1		8	8	7			24.4	23.1/24.1	22.6			7.8	8.0/8.0	7.7			7.6	7.2/7.3	7.0			1943	203/200	208		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	7																						
Chemistry Tech prerenewal/postrenewal								EDM	BDJ/BDJ	BDJ			EDM	BDJ/BDJ	BDJ			EDM	BDJ/BDJ	BDJ			EDM	BDJ/BDJ	BDJ		

Test: AC-Acute Fish Test							Test ID: CMDNPP		
Species: PP-Pimephales promelas							Protocol: EPAAW02-EPA/821/R-02-012		
Sample ID: AR0022365							Sample Type: EFF1-POTW		
Start Date:		End Date:					Lab ID: ADEQ880630		
Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
1	8	3	12						
2	10	5	12						
3	20	5	21						
4	25	5	28						
5	22	2	28						
6	29	4	37						
7	16	1	21						
8	9	4	12						
9	3	3	D-Control						
10	17	2	21						
11	15	5	16						
12	19	4	21						
13	5	5	D-Control						
14	30	5	37						
15	27	2	37						
16	13	3	16						
17	21	1	28						
18	12	2	16						
19	7	2	12						
20	2	2	D-Control						
21	14	4	16						
22	18	3	21						
23	28	3	37						
24	6	1	12						
25	11	1	16						
26	24	4	28						
27	23	3	28						
28	26	1	37						
29	4	4	D-Control						
30	1	1	D-Control						

Comments:

ToxCalc 5.0

Reviewed by: 6Q3/18/19

APPENDIX C
STATISTICAL ANALYSES

Daphnid Acute Test-48 Hr Survival

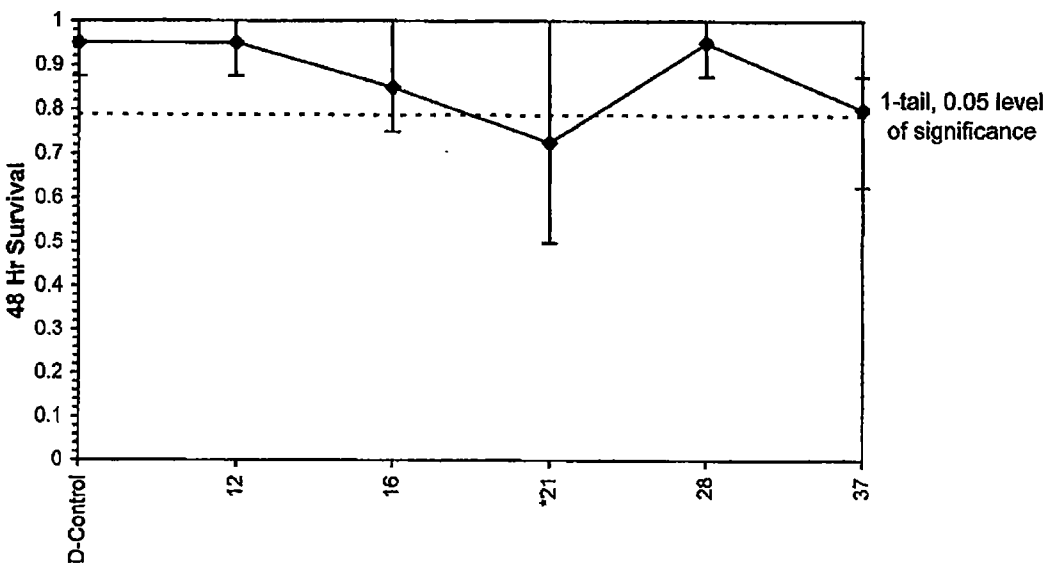
Start Date:	3/20/2019	Test ID:	X6996DP	Sample ID:	AR0022365
End Date:	3/22/2019	Lab ID:	ADEQ880630	Sample Type:	EFF1-POTW
Sample Date:	3/19/2019	Protocol:	EPAAW02-EPA/821/R-02-01	Test Species:	DP-Daphnia pulex
Comments:					

Conc-%	1	2	3	4	5
D-Control	1.0000	1.0000	0.8750	1.0000	0.8750
12	1.0000	1.0000	0.8750	1.0000	0.8750
16	0.8750	1.0000	0.7500	0.8750	0.7500
21	0.5000	0.5000	0.8750	0.7500	1.0000
28	1.0000	1.0000	1.0000	0.8750	0.8750
37	0.8750	0.8750	0.8750	0.7500	0.6250

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	0.9500	1.0000	1.3196	1.2094	1.3931	7.623	5			
12	0.9500	1.0000	1.3196	1.2094	1.3931	7.623	5	0.000	2.360	0.2279
16	0.8500	0.8947	1.1813	1.0472	1.3931	12.150	5	1.433	2.360	0.2279
*21	0.7250	0.7632	1.0441	0.7854	1.3931	25.475	5	2.853	2.360	0.2279
28	0.9500	1.0000	1.3196	1.2094	1.3931	7.623	5	0.000	2.360	0.2279
37	0.8000	0.8421	1.1174	0.9117	1.2094	12.059	5	2.094	2.360	0.2279

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)					0.92893		0.927		0.08197	0.12495
Bartlett's Test indicates equal variances (p = 0.27)					6.44036		15.0863			
Hypothesis Test (1-tail, 0.05)	**NOEC**	**LOEC**	**ChV**	**TU**	**MSDu**	**MSDp**	**MSB**	**MSE**	**F-Prob**	**df**
Dunnett's Test Treatments vs D-Control	37	>37		2.7027	0.1507	0.16062	0.07268	0.02331	0.02621	5, 24

Dose-Response Plot



Reviewed by: EAB 3/29/19

Test: DA-Daphnid Acute Test — Test ID: X6996DP
Species: DP-Daphnia pulex — Protocol: EPAAW02-EPA/821/R-02-012
Sample ID: AR0022365 — Sample Type: EFF1-POTW
Start Date: 3/20/2019 — End Date: 3/22/2019 — Lab ID: ADEQ880630

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	D-Control	8	8	8			
	2	2	D-Control	8	8	8			
	3	3	D-Control	8	8	7			
	4	4	D-Control	8	8	8			
	5	5	D-Control	8	8	7			
	6	1	12	8	8	8			
	7	2	12	8	8	8			
	8	3	12	8	8	7			
	9	4	12	8	8	8			
	10	5	12	8	8	7			
	11	1	16	8	8	7			
	12	2	16	8	8	8			
	13	3	16	8	8	6			
	14	4	16	8	8	7			
	15	5	16	8	8	6			
	16	1	21	8	8	4			
	17	2	21	8	8	4			
	18	3	21	8	8	7			
	19	4	21	8	8	6			
	20	5	21	8	8	8			
	21	1	28	8	8	8			
	22	2	28	8	8	8			
	23	3	28	8	8	8			
	24	4	28	8	8	7			
	25	5	28	8	8	7			
	26	1	37	8	8	7			
	27	2	37	8	8	7			
	28	3	37	8	8	7			
	29	4	37	8	8	6			
	30	5	37	8	8	5			

Comments:

Reviewed by: EB 3/29/19

Acute Fish Test-48 Hr Survival

Start Date:	3/20/2019	Test ID:	X6996PP	Sample ID:	AR0022365
End Date:	3/22/2019	Lab ID:	ADEQ880630	Sample Type:	EFF1-POTW
Sample Date:	3/19/2019	Protocol:	EPAAW02-EPA/821/R-02-01	Test Species:	PP-Pimephales promelas
Comments:					

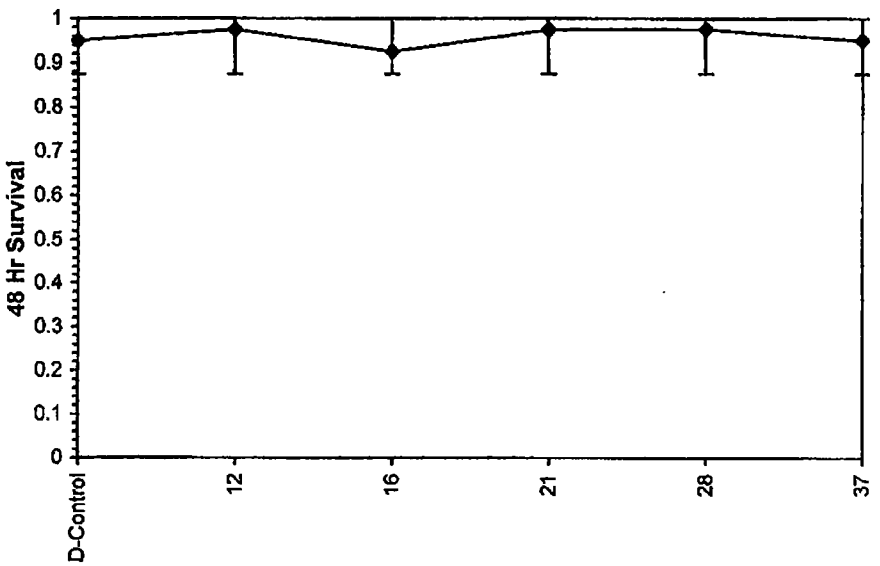
Conc-%	1	2	3	4	5
D-Control	1.0000	1.0000	0.8750	0.8750	1.0000
12	1.0000	0.8750	1.0000	1.0000	1.0000
16	0.8750	0.8750	1.0000	0.8750	1.0000
21	0.8750	1.0000	1.0000	1.0000	1.0000
28	1.0000	0.8750	1.0000	1.0000	1.0000
37	0.8750	1.0000	1.0000	1.0000	0.8750

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
D-Control	0.9500	1.0000	1.3196	1.2094	1.3931	7.623	5		
12	0.9750	1.0263	1.3564	1.2094	1.3931	6.055	5	30.00	16.00
16	0.9250	0.9737	1.2829	1.2094	1.3931	7.841	5	25.00	16.00
21	0.9750	1.0263	1.3564	1.2094	1.3931	6.055	5	30.00	16.00
28	0.9750	1.0263	1.3564	1.2094	1.3931	6.055	5	30.00	16.00
37	0.9500	1.0000	1.3196	1.2094	1.3931	7.623	5	27.50	16.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.82426	0.927	-0.6595	-1.1017
Bartlett's Test indicates equal variances (p = 0.99)	0.44646	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	37	>37		2.7027
Treatments vs D-Control				

Dose-Response Plot



Reviewed by: EVB 3/29/19

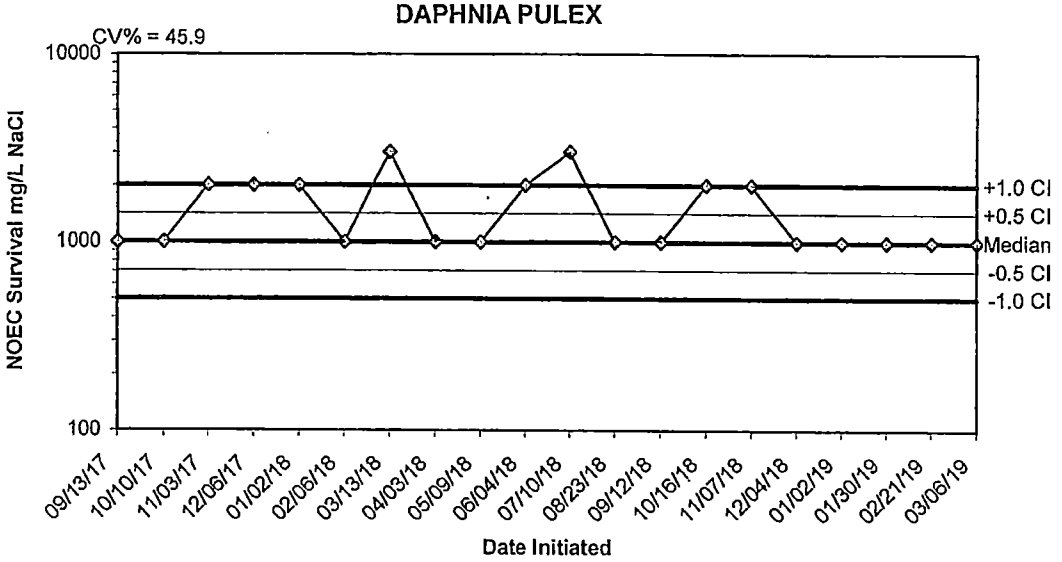
Test: AC-Acute Fish Test							Test ID: X6996PP		
Species: PP-Pimephales promelas							Protocol: EPAAW02-EPA/821/R-02-012		
Sample ID: AR0022365							Sample Type: EFF1-POTW		
Start Date: 3/20/2019			End Date: 3/22/2019				Lab ID: ADEQ880630		
Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	1	D-Control	8	8	8			
	2	2	D-Control	8	8	8			
	3	3	D-Control	8	8	7			
	4	4	D-Control	8	8	7			
	5	5	D-Control	8	8	8			
	6	1	12	8	8	8			
	7	2	12	8	8	7			
	8	3	12	8	8	8			
	9	4	12	8	8	8			
	10	5	12	8	8	8			
	11	1	16	8	8	7			
	12	2	16	8	8	7			
	13	3	16	8	8	8			
	14	4	16	8	8	7			
	15	5	16	8	8	8			
	16	1	21	8	8	7			
	17	2	21	8	8	8			
	18	3	21	8	8	8			
	19	4	21	8	8	8			
	20	5	21	8	8	8			
	21	1	28	8	8	8			
	22	2	28	8	8	7			
	23	3	28	8	8	8			
	24	4	28	8	8	8			
	25	5	28	8	8	8			
	26	1	37	8	8	7			
	27	2	37	8	8	8			
	28	3	37	8	8	8			
	29	4	37	8	8	8			
	30	5	37	8	8	7			

Comments:

Reviewed by: ELB 3/29/19

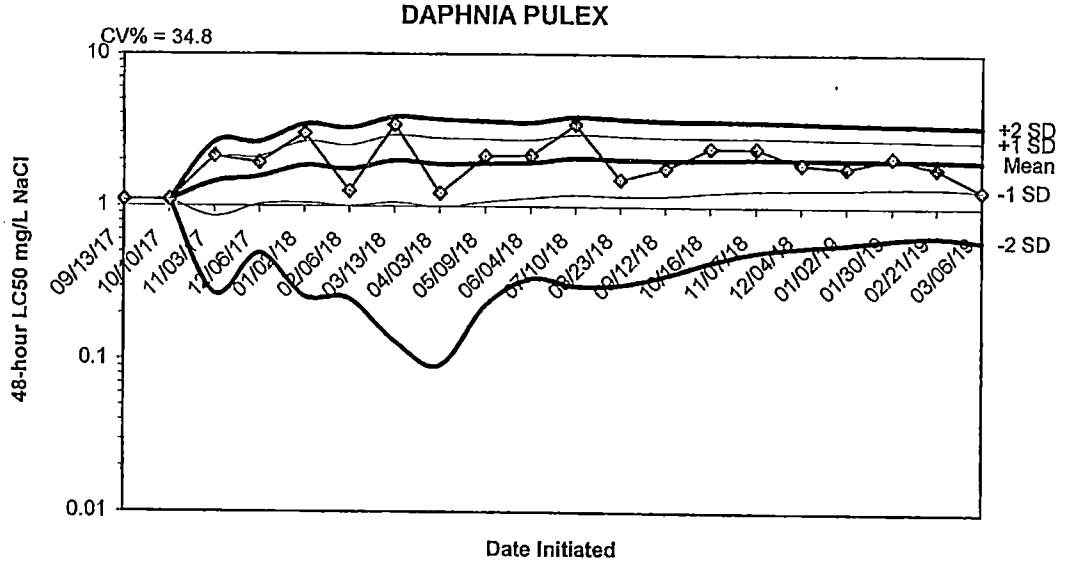
APPENDIX D
QUALITY ASSURANCE CHARTS

2019 48-HOUR ACUTE REFERENCE TOXICANT TEST RESULTS USING DAPHNIA PULEX



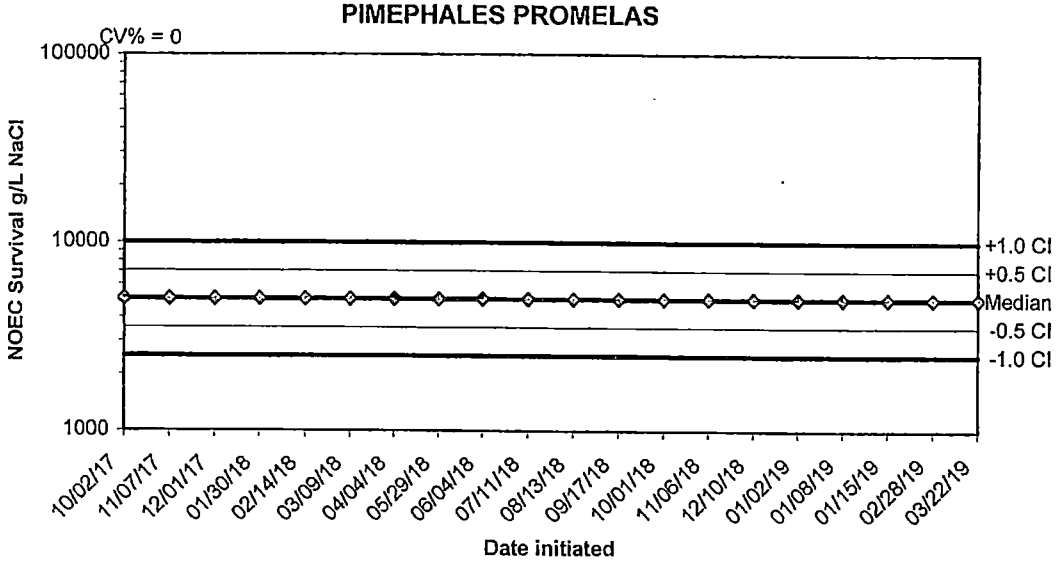
Dates	Values	Median	-0.5 CI	-1.0 CI	+0.5 CI	+1.0 CI
09/13/17	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
10/10/17	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
11/03/17	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
12/06/17	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
01/02/18	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
02/06/18	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
03/13/18	3000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
04/03/18	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
05/09/18	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
06/04/18	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
07/10/18	3000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
08/23/18	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
09/12/18	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
10/16/18	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
11/07/18	2000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
12/04/18	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
01/02/19	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
01/30/19	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
02/21/19	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
03/06/19	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000

2019 48-HOUR ACUTE REFERENCE TOXICANT TEST RESULTS USING DAPHNIA PULEX



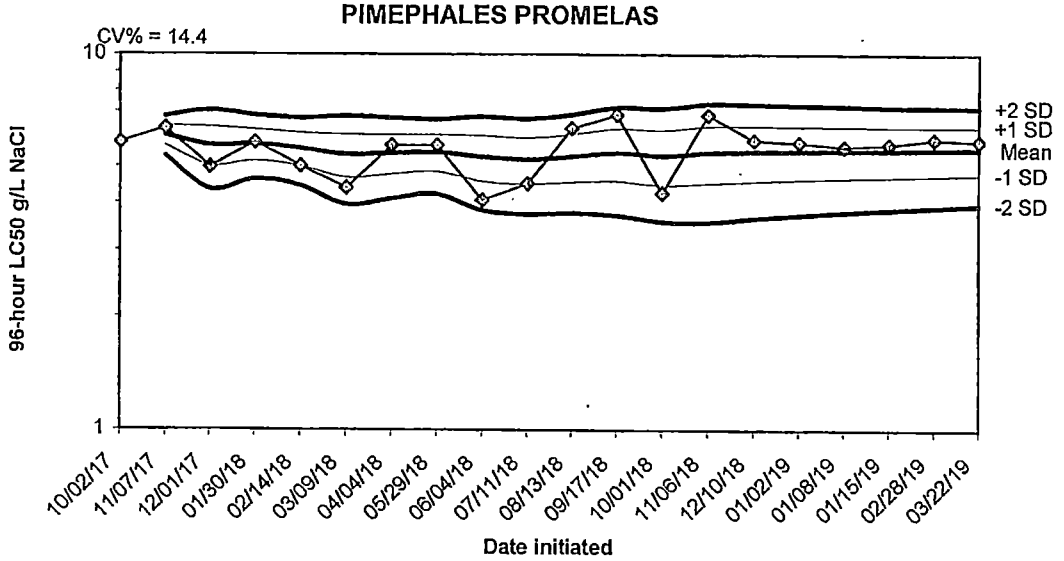
Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
09/13/17	1.1000					
10/10/17	1.0991	1.0996	1.0989	1.0983	1.1002	1.1008
11/03/17	2.1100	1.4364	0.8530	0.2696	2.0198	2.6031
12/06/17	1.9200	1.5573	1.0231	0.4889	2.0915	2.6257
01/02/18	3.0000	1.8458	1.0519	0.2580	2.6397	3.4337
02/06/18	1.2600	1.7482	0.9989	0.2496	2.4975	3.2468
03/13/18	3.4000	1.9842	1.0581	0.1320	2.9103	3.8364
04/03/18	1.2200	1.8886	0.9897	0.0907	2.7876	3.6866
05/09/18	2.1300	1.9155	1.0707	0.2260	2.7602	3.6049
06/04/18	2.1500	1.9389	1.1390	0.3392	2.7388	3.5387
07/10/18	3.4600	2.0772	1.1905	0.3039	2.9638	3.8505
08/23/18	1.5100	2.0299	1.1688	0.3077	2.8910	3.7521
09/12/18	1.7900	2.0115	1.1843	0.3572	2.8386	3.6657
10/16/18	2.4200	2.0407	1.2385	0.4364	2.8428	3.6449
11/07/18	2.4200	2.0659	1.2868	0.5077	2.8451	3.6242
12/04/18	1.9100	2.0562	1.3025	0.5487	2.8099	3.5637
01/02/19	1.8100	2.0417	1.3095	0.5772	2.7739	3.5062
01/30/19	2.1200	2.0461	1.3354	0.6248	2.7567	3.4673
02/21/19	1.8100	2.0336	1.3409	0.6482	2.7263	3.4191
03/06/19	1.2894	1.9964	1.3020	0.6075	2.6909	3.3854

2019 96-HOUR ACUTE REFERENCE TOXICANT TEST RESULTS USING PIMEPHALES PROMELAS



Dates	Values	Median	-0.5 CI	-1.0 CI	+0.5 CI	+1.0 CI
10/02/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
11/07/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
12/01/17	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
01/30/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
02/14/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
03/09/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
04/04/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
05/29/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
06/04/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
07/11/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
08/13/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
09/17/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
10/01/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
11/06/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
12/10/18	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
01/02/19	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
01/08/19	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
01/15/19	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
02/28/19	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000
03/22/19	5000.0000	5000.0000	3535.5339	2500.0000	7071.0678	10000.0000

2019 96-HOUR ACUTE REFERENCE TOXICANT TEST RESULTS USING PIMEPHALES PROMELAS



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
10/02/17	5.7891					
11/07/17	6.3100	6.0496	5.6812	5.3129	6.4179	6.7862
12/01/17	4.9800	5.6930	5.0228	4.3527	6.3632	7.0334
01/30/18	5.7900	5.7173	5.1679	4.6186	6.2666	6.8160
02/14/18	5.0200	5.5778	5.0090	4.4401	6.1467	6.7155
03/09/18	4.3800	5.3782	4.6725	3.9668	6.0839	6.7895
04/04/18	5.6900	5.4227	4.7678	4.1129	6.0776	6.7325
05/29/18	5.6900	5.4561	4.8425	4.2289	6.0698	6.6834
06/04/18	4.0700	5.3021	4.5653	3.8284	6.0390	6.7758
07/11/18	4.5000	5.2219	4.4823	3.7428	5.9615	6.7011
08/13/18	6.3300	5.3226	4.5455	3.7684	6.0998	6.8769
09/17/18	6.8700	5.4516	4.5864	3.7212	6.3168	7.1819
10/01/18	4.2600	5.3599	4.4681	3.5763	6.2518	7.1436
11/06/18	6.8700	5.4678	4.5207	3.5735	6.4149	7.3621
12/10/18	5.8800	5.4953	4.5764	3.6575	6.4141	7.3330
01/02/19	5.8100	5.5149	4.6238	3.7326	6.4061	7.2973
01/08/19	5.6565	5.5233	4.6597	3.7961	6.3868	7.2504
01/15/19	5.7400	5.5353	4.6960	3.8566	6.3747	7.2140
02/28/19	5.9200	5.5556	4.7351	3.9146	6.3760	7.1965
03/22/19	5.8600	5.5708	4.7693	3.9678	6.3723	7.1737

APPENDIX E
AGENCY FORMS

Acute Forms
Daphnia pulex Survival

Permittee: Camden Water Utilities
NPDES Permit Number: AR0022365/AFIN 52-00073
Composite Collected **From: 3/18/19** **To: 3/19/19**
From: 3/19/19 **To: 3/20/19**
Test Initiated: 3/20/19
Dilution Water Used: **Receiving Water** **X Reconstituted Water**

Dilution Series Results - Percent Survival

TIME OF READING	REP	0	12.0	16.0	21.0	28.0	37.0
24-hour	A	100.0	100.0	100.0	100.0	100.0	100.0
	B	100.0	100.0	100.0	100.0	100.0	100.0
	C	100.0	100.0	100.0	100.0	100.0	100.0
	D	100.0	100.0	100.0	100.0	100.0	100.0
	E	100.0	100.0	100.0	100.0	100.0	100.0
48-hour	A	100.0	100.0	87.5	50.0	100.0	87.5
	B	100.0	100.0	100.0	50.0	100.0	87.5
	C	87.5	87.5	75.0	87.5	100.0	87.5
	D	100.0	100.0	87.5	75.0	87.5	75.0
	E	87.5	87.5	75.0	100.0	87.5	62.5
	Mean	95.0	95.0	85.0	72.5	95.0	80.0

1. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate: Is the mean survival at 48 hours significantly different (p=.05) than the control survival for the % effluent corresponding to:
a.) LOW FLOW OR CRITICAL DILUTION (28.0%) **YES** **X** **NO**
b.)½ LOW FLOW OR 2X CRITICAL DILUTION (N/A%) **YES** **NO**
2. Enter percent effluent corresponding to the LC_{50} below:
LC_{50} = >37.0% effluent
95 % confidence limits: N/A
Method of LC_{50} calculation: N/A
3. If you answered NO to 1.a) enter (P) otherwise enter (F): P
4. Enter response to item 3 on DMR Form, parameter TEM3D
5. If you answered NO to 1.b) enter (P) otherwise enter (F): N/A
6. Enter response to item 5 on DMR Form, parameter TFM3D

Biomonitoring
Daphnia pulex 48 hour Acute Static Renewal
Chemical Parameters Chart*

Permittee: Camden Water Utilities
NPDES Number: AR0022365/AFIN 52-00073
Contact: Keith Ballard
Analyst: Ware, Morado, Jones
Sample Collected **From:** **Date 03/18/19** **Time 0800**
To: **Date 03/19/19** **Time 0800**
Test Begin **Date 03/20/19** **Time 1350**
Test End **Date 03/22/19** **Time 1350**

Parameter	D.O.			Temperature			Alkalinity			Hardness			pH		
Dilut./Time	0hrs.	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs
0.0	7.7	8.0	7.9	24.9	24.9	24.9	36.0			52.0			8.0	7.5	7.1
12.0	7.6	8.0	8.0	24.9	24.9	24.9							7.9	7.4	7.1
16.0	7.1	8.0	7.9	24.9	24.9	24.9							7.8	7.4	7.1
21.0	7.8	8.0	7.9	24.9	24.9	24.9							7.8	7.4	7.1
28.0	7.6	7.9	7.8	24.9	24.9	24.9							7.7	7.3	7.1
37.0	7.8	8.0	7.9	24.9	24.9	24.9	12.0	24.0		28.0	32.0		7.6	7.3	7.1

*This Form is to be submitted with each DMR.
Alkalinity and hardness to be reported as mg/l $CaCO_3$ on 100% effluent.

Acute Forms
Pimephales promelas Survival

Permittee: Camden Water Utilities
NPDES Permit Number: AR0022365/AFIN 52-00073
Composite Collected **From: 3/18/19** **To: 3/19/19**
From: 3/19/19 **To: 3/20/19**
Test Initiated: 3/20/19
Dilution Water Used: **Receiving Water** **X Reconstituted Water**

Dilution Series Results - Percent Survival

TIME OF READING	REP	0	12.0	16.0	21.0	28.0	37.0
24-hour	A	100.0	100.0	100.0	100.0	100.0	100.0
	B	100.0	100.0	100.0	100.0	100.0	100.0
	C	100.0	100.0	100.0	100.0	100.0	100.0
	D	100.0	100.0	100.0	100.0	100.0	100.0
	E	100.0	100.0	100.0	100.0	100.0	100.0
48-hour	A	100.0	100.0	87.5	87.5	100.0	87.5
	B	100.0	87.5	87.5	100.0	87.5	100.0
	C	87.5	100.0	100.0	100.0	100.0	100.0
	D	87.5	100.0	87.5	100.0	100.0	100.0
	E	100.0	100.0	100.0	100.0	100.0	87.5
	Mean	95.0	97.5	92.5	97.5	97.5	95.0

1. Dunnett's Procedure or Steel's Many-One Rank Test as appropriate: Is the mean survival at 48 hours significantly different (p=.05) than the control survival for the % effluent corresponding to:
a.) LOW FLOW OR CRITICAL DILUTION (28.0%) **YES** **X** **NO**
b.)½ LOW FLOW OR 2X CRITICAL DILUTION (N/A%) **YES** **NO**
2. Enter percent effluent corresponding to the LC_{50} below:
LC_{50} = >37.0% effluent
95 % confidence limits: N/A
Method of LC_{50} calculation: N/A
3. If you answered NO to 1.a) enter (P) otherwise enter (F): P
4. Enter response to item 3 on DMR Form, parameter TEM3D
5. If you answered NO to 1.b) enter (P) otherwise enter (F): N/A
6. Enter response to item 5 on DMR Form, parameter TFM3D

Biomonitoring
Pimephales promelas 48 hour Acute Static Renewal
Chemical Parameters Chart*

Permittee: Camden Water Utilities
NPDES Number: AR0022365/AFIN 52-00073
Contact: Keith Ballard
Analyst: Ware, Morado, Jones

Sample Collected	**From:**	**Date 03/18/19**	**Time 0800**
	To:	**Date 03/19/19**	**Time 0800**
Test Begin		**Date 03/20/19**	**Time 1400**
Test End		**Date 03/22/19**	**Time 1335**

Parameter	D.O.			Temperature			Alkalinity			Hardness			pH		
Dilut./Time	0hrs.	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs
0.0	7.7	8.0	7.8	24.9	24.9	24.9	36.0			52.0			8.0	7.5	7.0
12.0	7.6	8.0	7.8	24.9	24.9	24.9							7.9	7.4	7.0
16.0	7.1	8.0	7.7	24.9	24.9	24.9							7.8	7.4	7.0
21.0	7.8	8.0	7.7	24.9	24.9	24.9							7.8	7.4	7.0
28.0	7.6	7.9	7.7	24.9	24.9	24.9							7.7	7.3	7.0
37.0	7.8	8.0	7.7	24.9	24.9	24.9	12.0	24.0		28.0	32.0		7.6	7.3	7.0

*This Form is to be submitted with each DMR.
Alkalinity and hardness to be reported as mg/l $CaCO_3$ on 100% effluent.

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: Camden Water Utilities

Project#: X6996

Chain of Custody Documents Checked by: Erin Moore 4/1/19
Technician/Date

Raw Data Documents Checked by: Erin Moore 4/1/19
Technician/Date

Statistical Analysis Package Checked by: EGB 4/3/19
Quality Manager/Date

Quality Control Data Checked by: EGB 4/4/19
Quality Manager/Date

Report Checked by: EGB 4/4/19
Quality Manager/Date

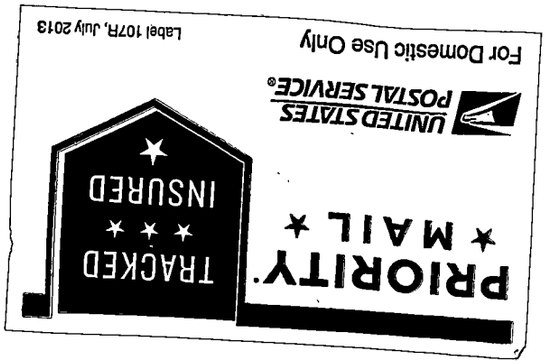
I certify that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. The information contained in this document, to the best of my knowledge, is true, accurate and complete.

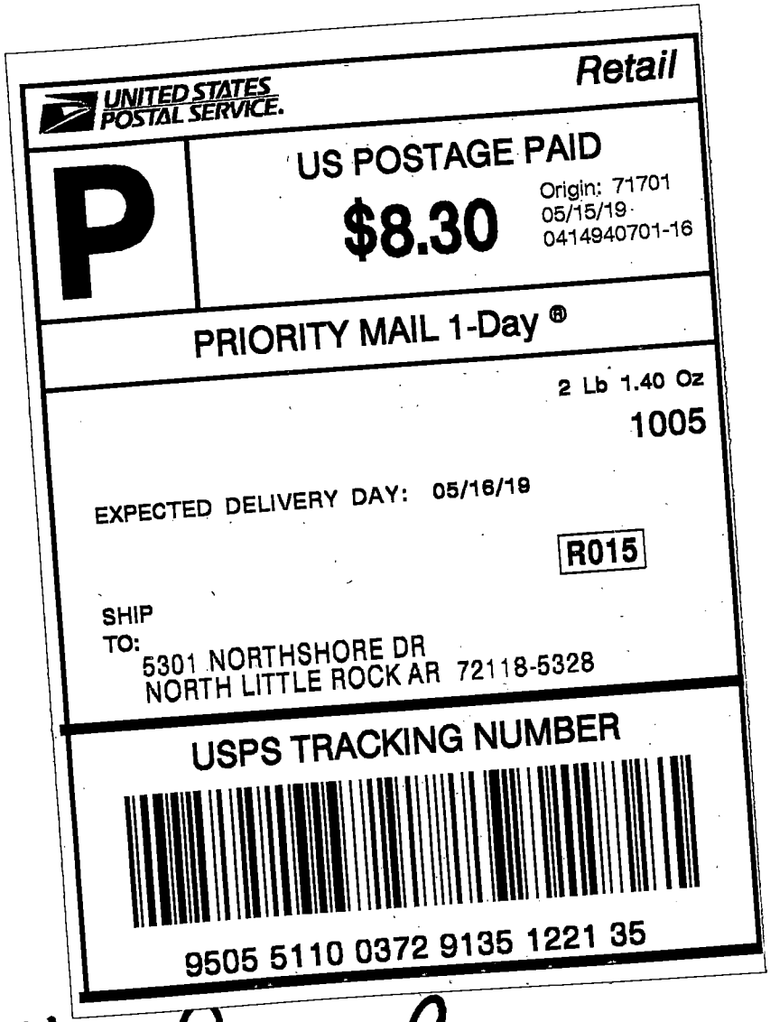
Erin L. Boggs BS
Quality Manager

4/4/19
Date

NELAP ACCREDITED LABORATORY

Camden Water Utilities
P.O. Box J
Camden, AR 71711





A.D.E.Q.
5301 Northshore Dr.
N. Little Rock, AR
72118-5317

Attn: Gavin Gray
Office of Water Quality