

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



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January 25, 2019

Arkansas Department of Environmental Quality
NPDES Enforcement Division.
5301 North Shore Drive
North Little Rock, Arkansas 72118-5317

RE: Camden Water Utilities, AR0022365
Biomonitoring Reduction Request

Dear Enforcement Division:

Attached is the last four passed quarterly Biomonitoring results for the periods of:

March 28,, 2018
May 31, 2018
August 15, 2018
November 28, 2018

As stated in Permit # AR0022365 , Camden Water Utilities is requesting a reduction in Biomonitoring.

If you have any questions concerning this request please do not hesitate to contact me.
Thanks for the consideration.

Sincerely,

A handwritten signature in cursive script that reads "David Richardson".

David Richardson
Camden Water Utilities, General Manager

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*:

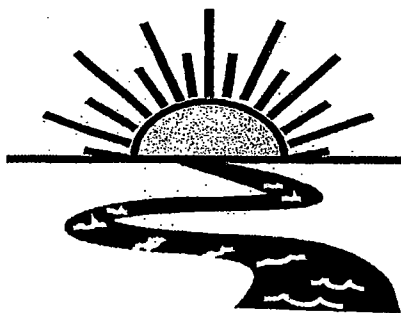
1. If the NOEC for survival is less than the critical dilution (28.0%), enter a "1"; otherwise, enter a "0" for Parameter No. TEM3D - 0 (Pass).
2. Report the NOEC value for survival, Parameter No. TOM3D - 37.0%.
3. Report the highest (critical dilution or control) Coefficient of Variation, Parameter 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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(318) 745-2772
1-800-259-1246
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 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

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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^o 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^o 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 CaCO₃ 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^o 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 LC₅₀ 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 LC₅₀ 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	
	<i>D. pulex</i>	<i>P.promelas</i>
Test Organism		
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 T1104704278

Laboratory Use Only:

Company: Camden Water Utilities		Phone: (870) 836-4329		Analysis:				Project Number: X6643 Temp. upon arrival: 0.5 Therm#: 29 Color: tan Odor: None Tech: EOW 3/28/18 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: <i>Annette Strickland</i> Annette Strickland											
Date Start Date End	Time Start Time End	C	G					# and type of container				Sample Identification	Lab Control Number:
8-26-18 8-27-18	8:00 AM 8:00 AM	X		2 half gallons	002- Day 1	05040	ICE				
8-27-18 8-28-18	8:00 AM 8:00 AM	X		2 half gallons	002- Day 2	C15041	↓				
8-28-18 8-28-18	8:00 A		X	6 half gallons	Rec Water	C15042	↓				
Relinquished by/Affiliation: <i>Mike Langley oper</i>				Date: 3-28-18	Time: 1045	Received by/Affiliation: <i>J B</i>		Date: 3-28-18	Time: 1045		
Relinquished by/Affiliation:				Date:	Time:	Received by/Affiliation:		Date:	Time:		
Relinquished by/Affiliation: <i>J B</i>				Date: 3-28-18	Time: 1315	Received by/Affiliation: <i>Engmore</i>		Date: 3-28-18	Time: 1315		
Method of Shipment: <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Bus <input type="checkbox"/> Fed Ex <input type="checkbox"/> DHL <input type="checkbox"/> UPS <input type="checkbox"/> Client <input type="checkbox"/> Other Tracking # _____											
Comments:											

3/26-
28/18 }
EOW
3/28/18

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:				Project Number: X16643 Temp. upon arrival: 1.6 Therm#: 29 Color: Clear Odor: Septic Tech: EDW 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				
Permit #: AR0022365/ AFIN 52-00073		Purchase Order:							Acute Mysid	Acute Ceriodaphnia	Fecal Coliform
Sampler's Signature/Printed Name/Affiliation: <i>Annette Strickland / Annette Strickland</i>												Lab Control Number:
Date Start Date End	Time Start Time End	C	G					# and type of container					Sample Identification
4-16-18	0500										
4-17-18	0500	X		2 half gallons	002- Day 1						
4-17-18	0500										
4-18-18	0500	X		2 half gallons	002- Day 2						
Relinquished by/Affiliation: <i>Mike Langley</i>				Date: 4-18-18	Time: 9:30 A	Received by/Affiliation: <i>D.W. Bragg</i>		Date: 4/18/18	Time: 0935		
Relinquished by/Affiliation:				Date:	Time:	Received by/Affiliation:		Date:	Time:		
Relinquished by/Affiliation: <i>D.W. Bragg</i>				Date: 4/18/18	Time: 1240	Received by/Affiliation: <i>Enigma</i>		Date: 4/18/18	Time: 1240		
Method of Shipment: <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Bus <input type="checkbox"/> Fed Ex <input type="checkbox"/> DHL <input type="checkbox"/> UPS <input type="checkbox"/> Client <input type="checkbox"/> Other Tracking # _____											
Comments: ↓ Dates and times on bottles. <i>EDB 4/18/18</i>											
COC Rev. 3.1											

X
2/28
4/18/18

**APPENDIX B
RAW DATA SHEETS**

BIO-ANALYTICAL LABORATORIES
ACUTE TOXICITY TEST WATER QUALITY DATA

Project#

X6643

Client: CMND/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 ^{21g} 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	8.9/111.5	7/10	0.0	NO	3.0	N/A	36.0	20.0	MV
C15041	10.6/129.5	7/10/7.8/97.1	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
CMV 3/28/18			7/10/7.7/94.0						
Soft Rec	15042	9.3/115.0	0.0	0.0	0	6.7	24.0	12.0	MV
		9.8/127.0	7/10/7.7/97.3	↓	↓	↓	↓	↓	LEM

Test Species Information

Test Species Info.	Species: D.pulex ID#: BAL A91-B30	Species: P.promelas ID#: P.91 32217	Species: ID#:	Species: ID#:
Age	< 24 hours	LE 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:

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

Project# X66 43

Test started: Date 3/23/18 Time 1500

Client Camden

Test ended: Date 3/30/18 Time 1405

Sample Description 002

Test Species P. promelas ID# 6A13228

Technician: Ohour mv 24hour EDU 48hour mv 72hour _____ 96hour _____

Time: Ohour 1500 24hour 1120 48hour 1405 72hour _____ 96hour _____

Temperature (°C): Ohour 25.0 24hour 25.3 48hour 22.0 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
16	1	n/a	8	8	8			22.0	22.0	22.0			7.73	7.6	7.5			7.26	7.2	7.1			111.6	102	105.9		
	2		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	3		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	4		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	5		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
21	1		8	8	8			25.2	23.6	23.2			7.74	7.7	7.9			6.1	6.6	7.8			133.5	149.9	145.0		
	2		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	3		8	8	7			/	/	/			/	/	/			/	/	/			/	/	/		
	4		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	5		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
			Chemistry Tech prerenewal/postrenewal					mv EDU					mv EDU					mv EDU					mv EDU				

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# 32132217

Technician: 0hour EV 24hour EV 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
70		n/a																									
28	1		8	8	8			25.3	25.1	25.3			7.5	7.6	7.4			7.5	7.6	7.4			28.2	28.2	28.2		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
37	1		8	8	8			25.1	25.1	25.3			7.4	7.7	7.5			7.4	7.6	7.4			27.7	27.7	27.7		
	2		8	7	7																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal																											

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

X6643 Page 17 of 48

Project# X6643

Test started: Date 3/28/18 Time 1500

Client Camden

Test ended: Date 3/30/18 Time 1409

Sample Description 002

Test Species P. promelas ID# BA 3RA17

Technician: 0hour mv 24hour EDW 48hour mv 72hour _____ 96hour _____

Time: 0hour 1500 24hour 1400 48hour 1003 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					
5%		N/A																														
SEPT ✓	1		8	8	8																											
	2		8	8	8																											
	3		8	8	8																											
	4		8	8	8																											
	5		8	8	8																											
																			</													

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%	4/10/7.5 94.9%	<0.01	NO	1.0	N/A	28.0	24.0	EDW
C15159	9.8/120.6%	4/10/8.1 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	479	N/A	—	—	—	6.8	44.0	24.0	LEM

Test Species Information

Test Species Info.	Species: D.pulex ID#: <u>DM-1833-C34</u>	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 <u>mu 4/19/18 - Fair</u>				

Comments:

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# BMLA33-C34

Technician: Ohour 1911 24hour 1911 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 412018

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					
90																																
0 soft	1	N/A	8	8	8			24.6	24.8	24.5			8.0	8.0	7.6			7.5	7.4	7.5			220	210	203			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	24.5			7.9	7.8	7.5			7.5	7.3	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																																

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

X6643
Page 21 of 48

Project# X6643

Test started: Date 4/18/18

Time 1400

Client Camden

Test ended: Date 4/19/18

Time 1240

Sample Description 002

Test Species D. pulex

ID# BHL 1933-C34

Technician: Ohour SEM 24hour SEM 48hour mv 72hour _____ 96hour _____
 Time: Ohour 1900 24hour 1135 48hour 1240 72hour _____ 96hour _____
 Temperature (°C): Ohour 15.1 24hour 25.5 48hour 25.5 72hour _____ 96hour _____

a mv 4125/18

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					
90																																
16	1	N/A	8	8	8			25.1	25.6	24.5			7.9	7.8	7.4			7.3	7.2	7.5			230	223	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	24.2			7.9	7.9	7.3			7.3	7.2	7.4			230	225	241							
	2		8	7	6																											
	3		8	8	8																											
	4		8	8	8																											
	5		8	8	8																											
Chemistry Tech prerenewal/postrenewal			Camden					Camden					Camden					Camden														

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

Project# X6643

Test started: Date 4/18/8

Time 1400

Client Camden

Test ended: Date 4/19/8

Time 1340

Sample Description 002

Test Species D. Pulex

ID# BA33-004

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

Time: Ohour 1400 24hour 135 48hour 140 72hour _____ 96hour _____

Temperature (°C): Ohour 25.1 24hour 25 48hour 25.5 72hour _____ 96hour _____

→ 41251.0 mv

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	7	6			25.5	25.5	24.7			7.8	7.8	7.3			7.2	7.2	7.4			231	225	241		
	2	|	8	7	7			/	/	/			/	/	/			/	/	/			/	/	/		
	3	|	8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	4	|	8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	5	|	8	8	7			/	/	/			/	/	/			/	/	/			/	/	/		
37%	1	|	8	8	6			25.7	25.7	24.7			7.8	7.8	7.2			7.2	7.2	7.4			231	225	242		
	2	|	8	8	7			/	/	/			/	/	/			/	/	/			/	/	/		
	3	|	8	7	7			/	/	/			/	/	/			/	/	/			/	/	/		
	4	|	8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	5	|	8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		

Chemistry Tech
prerenewal/postrenewal

Camden

Camden

Camden

Camden

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:

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

Test started: Date 3/28/18 Time 1455
 Test ended: Date 3/30/18 Time 1400
 Test Species D. pulex ID# B17A31-B30

Sample Description 002
 Technician: 0hour EM 24hour EM 48hour EM 72hour _____ 96hour _____
 Time: 0hour 1455 24hour 1511 48hour 1400 72hour _____ 96hour _____
 Temperature (°C): 0hour 25.8 24hour 25.6 48hour 25.7 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
70		n/a																									
0	1		8	8	6			25.7	25.0	25.0			7.5	7.6	7.8			6.7	6.3	6.3			376	372	374.8		
	2		8	7	7			/	/	/			/	/	/			/	/	/			/	/	/		
	3		8	5	1			/	/	/			/	/	/			/	/	/			/	/	/		
	4		8	5	4			/	/	/			/	/	/			/	/	/			/	/	/		
	5		8	8	7			/	/	/			/	/	/			/	/	/			/	/	/		
12	1		8	8	6			25.7	25.0	24.1			7.5	7.6	7.8			6.6	6.1	7.2			373	373	379.8		
	2		8	8	5			/	/	/			/	/	/			/	/	/			/	/	/		
	3		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	4		8	8	7			/	/	/			/	/	/			/	/	/			/	/	/		
	5		8	8	7			/	/	/			/	/	/			/	/	/			/	/	/		
Chemistry Tech prerenewal/postrenewal																											

EM
3/28/18

EM
3/28/18

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

Project# XU043
Client Camden

Test started: Date 3/28/18 Time 1455
Test ended: Date 3/30/18 Time 1400

Sample Description 002
Technician: Ohour EDW 24hour EDW 48hour lem 72hour _____ 96hour _____
Time: Ohour 1455 24hour 1511 48hour 1400 72hour _____ 96hour _____
Temperature (°C): Ohour 25.8 24hour 23.6 48hour 25.8 72hour _____ 96hour _____

Test Species D. pulex ID# BALAZI-1830

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
7.		N/A																									
16	1		8	8	7			25.0	27.1	24.0			7.7	7.6	7.8			6.2	7.0	7.1			111.6	151.1	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	27.3	24.0			7.7	7.7	7.8			6.1	6.8	7.0			133.2	167.0	135.8		
	2		8	7	7			/	/	/			/	/	/			/	/	/			/	/	/		
	3		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	4		8	8	7			/	/	/			/	/	/			/	/	/			/	/	/		
	5		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
Chemistry Tech prerenewal/postrenewal			m. [signature]					m. [signature]					m. [signature]					m. [signature]									

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

Project# X16643

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# BAL A31-B30

Technician: 0hour LEM 24hour EDU 48hour LEM 72hour _____ 96hour _____

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

Temperature (°C): 0hour 25.6 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		
28	1	N/A	8	8	5			25.3	25.6	27.3	24.1			7.7	7.6	7.6	7.7			6.5	6.8	5.9	7.0			288	285	283	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	24.3			7.8	7.7	7.7	7.7			6.6	6.8	5.8	7.7			286	280	280	205
	2		8	8	8																								
	3		8	8	8																								
	4		8	8	7																								
	5		8	8	7																								
Chemistry Tech prerenewal/postrenewal								mv 25.1 24.1					mv 25.1 24.1					mv 25.1 24.1					mv 25.1 24.1						

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

Project# XLE143

Test started: Date 3/28/18

Time 1455

Client Camden

Test ended: Date 3/30/18

Time 1400

Sample Description CO2

Test Species D.pulex

ID# BAL931-830

Technician: 0hour EM 24hour EM 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	# 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 ✓	1	N/A	8	8	8			27.4	27.7	24.0			7.2	7.4	7.5	7.7			8.0	7.7	7.2			217	205	202		
	2		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/			
	3		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/			
	4		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/			
	5		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/			
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10643

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:

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:

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

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root					Rank Sum	1-Tailed Critical
			Mean	Min	Max	CV%	N		
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

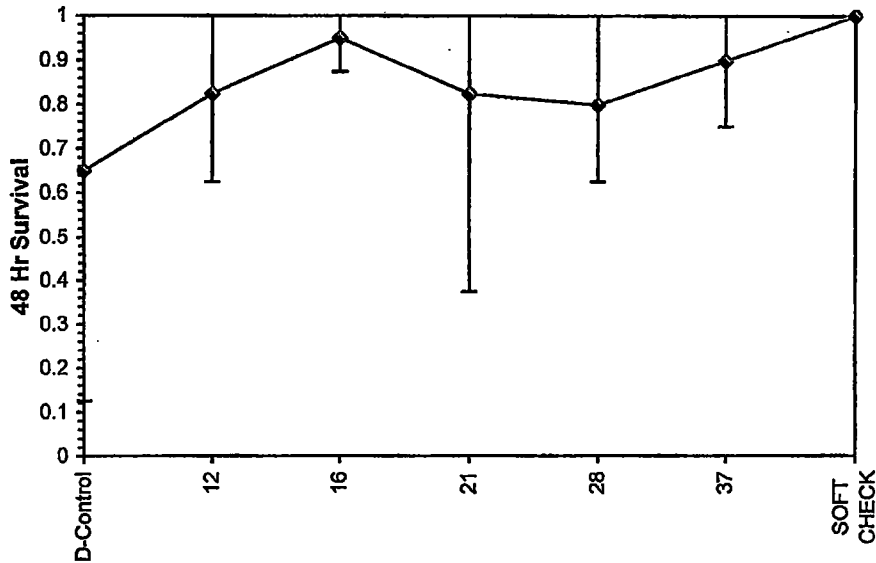
Equality of variance cannot be confirmed

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%

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:

Handwritten signature and date: 4/14/18

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

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

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root					Rank Sum	1-Tailed Critical
			Mean	Min	Max	CV%	N		
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

Auxillary Tests

Shapiro-Wilk's Test indicates non-normal distribution ($p \leq 0.05$)	Statistic: 0.67398	Critical: 0.934	Skew: -1.5743	Kurt: 4.34273
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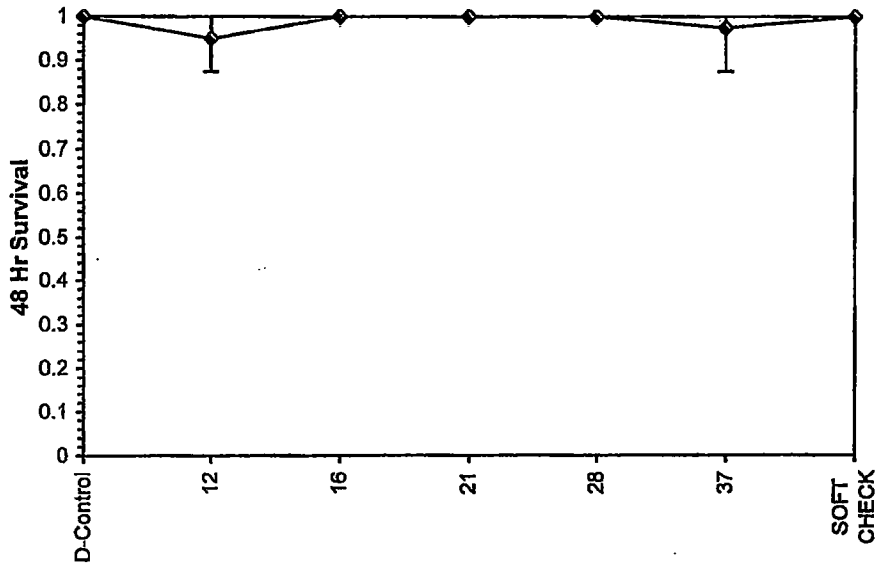
Equality of variance cannot be confirmed

Hypothesis Test (1-tail, 0.05)

Steel's Many-One Rank Test indicates no significant differences

Treatments vs D-Control

Dose-Response Plot



Test: DA-Daphnid Acute Test
 Species: DP-Daphnia pulex
 Sample ID: AR0022365
 Start Date: 4/18/2018

End Date: 4/20/2018

Test ID: X6643DPV
 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	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:

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

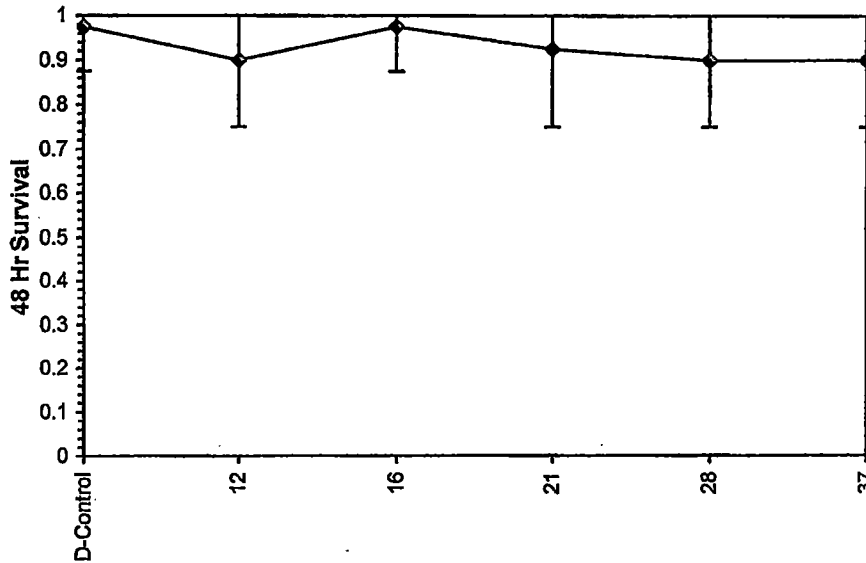
Comments:

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

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

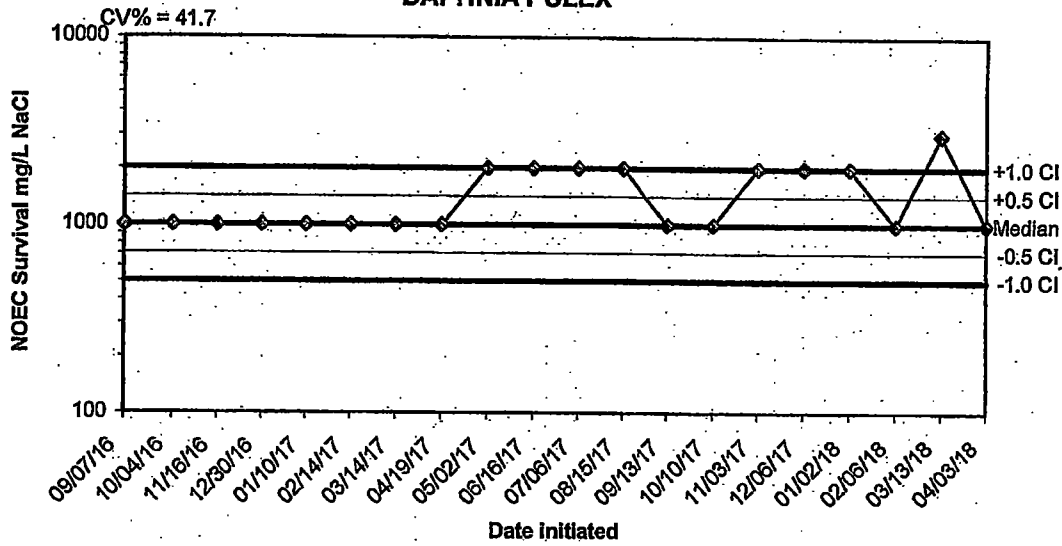
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.89748	0.927	-0.5518	-0.6935
Bartlett's Test indicates equal variances (p = 0.71)	2.91111	15.0863		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	37	>37		2.7027

Dose-Response Plot



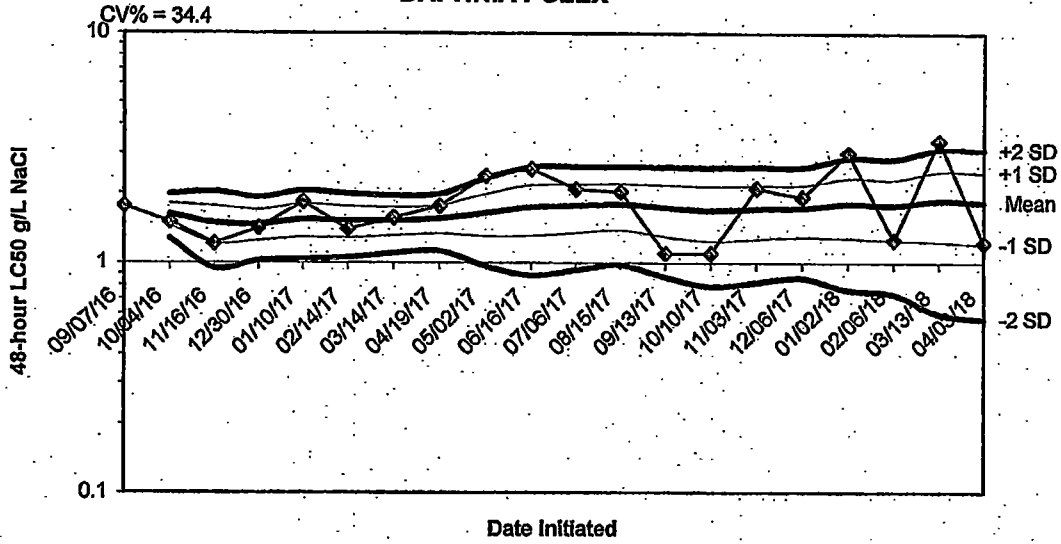
APPENDIX E
QUALITY ASSURANCE CHARTS

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



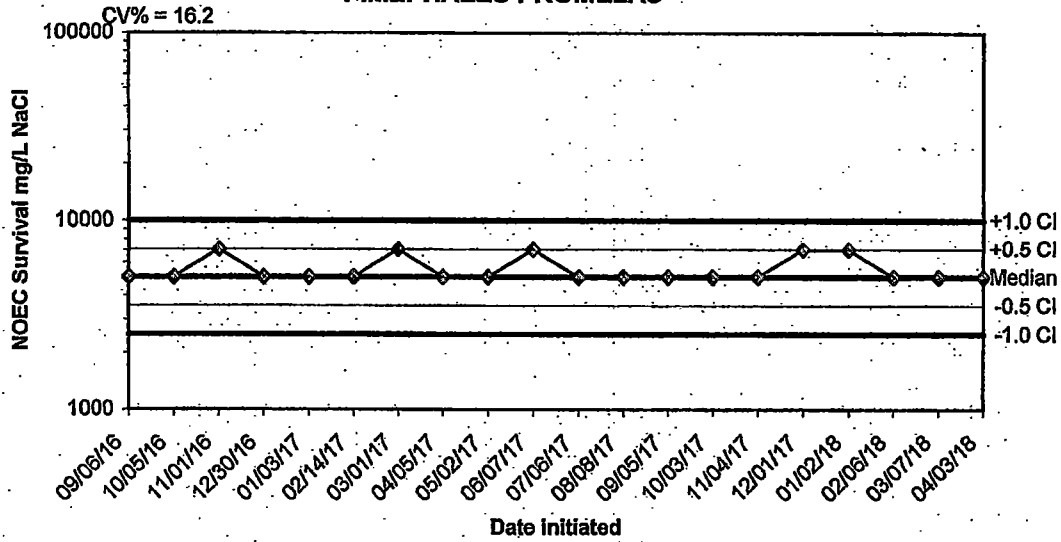
Dates	Values	Median	-0.5 CI	-1.0 CI	+0.5 CI	+1.0 CI
09/07/16	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
10/04/16	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
11/16/16	1000.0000	1000.0000	707.1068	500.0000	1414.2136	2000.0000
12/30/16	1000.0000	1000.0000	707.1068	500.0000	1414.2136	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**



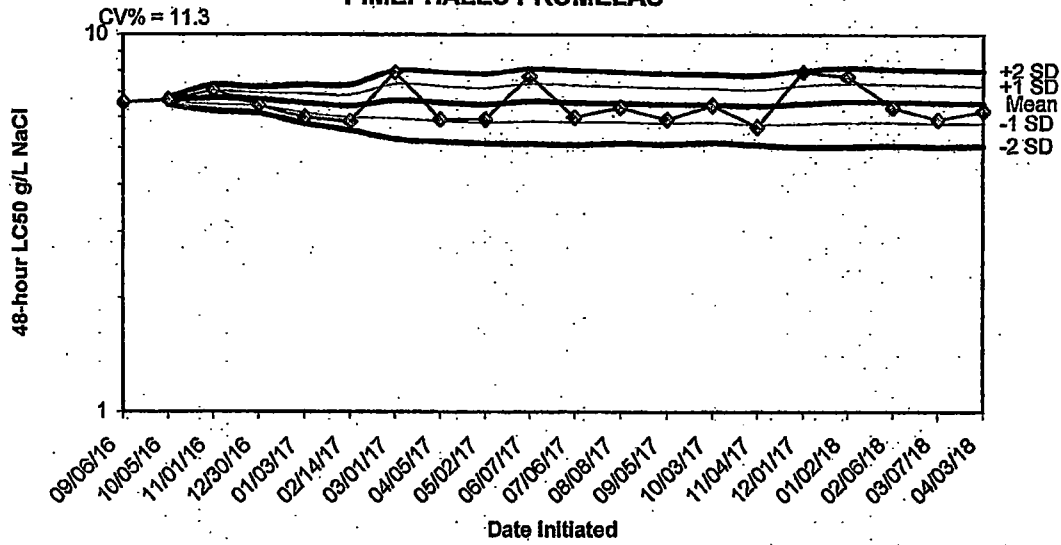
Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
09/07/16	1.7500					
10/04/16	1.5000	1.6250	1.4482	1.2714	1.8018	1.9786
11/16/16	1.2100	1.4867	1.2164	0.9462	1.7569	2.0272
12/30/16	1.4100	1.4675	1.2435	1.0196	1.6915	1.9154
01/10/17	1.8300	1.5400	1.2872	1.0344	1.7928	2.0456
02/14/17	1.4000	1.5167	1.2835	1.0502	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
02/08/18	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.) **1/2 LOW FLOW OR 2X CRITICAL DILUTION (N/A%)** YES NO

2. Enter percent effluent corresponding to the LC₅₀ below:

LC₅₀ = >37.0% effluent

95 % confidence limits: N/A

Method of LC₅₀ 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 CaCO₃ 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

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 NO

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

2. Enter percent effluent corresponding to the LC₅₀ below:

LC₅₀ = >37.0% effluent

95 % confidence limits: N/A

Method of LC₅₀ 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***

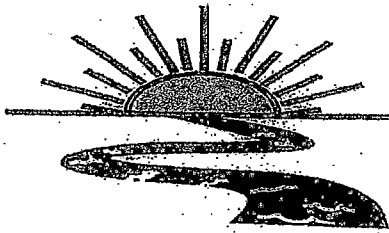
Permittee: Camden Water Utilities
NPDES Number: AR0022365/AFIN 52-00073
Contact: Keith Ballard
Analyst: Morado, Valle

Sample Collected **From:** **Date 4/16/18** **Time 0800**
Test Begin **To:** **Date 4/17/18** **Time 0800**
Test End **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 CaCO₃ 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#: X16643

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

Raw Data Documents Checked by: Enj 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 S. Bragg, BS 4/26/18
Quality Manager Date

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

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:

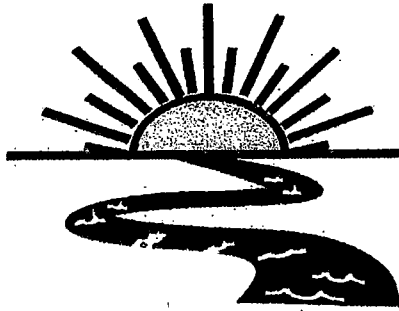
For *Daphnia pulex*:

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
ADEQ #880630

BAL
ADEQ #880630
Project X6707

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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 (LC₅₀), 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.

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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^o 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^o 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 CaCO₃ 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^o 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 LC₅₀ values were also obtained using the ToxCalc program.

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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 LC₅₀ 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	
	<i>D. pulex</i>	<i>P.promelas</i>
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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ADEQ #880630
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

3240 Spurgin Road
Post Office Box 527
Bayline, LA 71023

(318) 745-2772
1-800-253-1248
Fax: (318) 745-2773

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

X6707
Page 10 of 36

Laboratory Use Only:

Company: Camden Water Utilities		Phone: (870) 836-4329		Analysis:				Project Number: <i>esam st 1/8</i> 708 <i>707</i> Temp. upon arrival: 0.9 Therm#: 29 Color: brownish Odor: none Tech: LEM 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	Lab Control Number:			
Permit #: AR0022365/ AFIN 52-00073		Purchase Order:						
Sampler's Signature/Printed Name/Affiliation: <i>Annette Strickland / Annette Strickland</i>								
Date Start Date End	Time Start Time End	C	G			# and type of container	Sample Identification	C15370 ICE
<i>5-29-18</i> <i>5-30-18</i>	<i>8:00 AM</i> <i>8:00 AM</i>	<i>X</i>		<i>2 half gallons</i>	<i>002- Day 1</i>			
<i>5-30-18</i> <i>5-31-18</i>	<i>8:00 AM</i> <i>8:00 AM</i>	<i>X</i>		<i>2 half gallons</i>	<i>002- Day 2</i>	<i>C15371</i>		
Relinquished by/Affiliation: <i>Mike Jangley</i>		Date: <i>5-31-18</i>	Time: <i>9:20</i>	Received by/Affiliation: <i>[Signature]</i>		Date: <i>5-31-18</i>	Time: <i>0920</i>	
Relinquished by/Affiliation:		Date:	Time:	Received by/Affiliation:		Date:	Time:	
Relinquished by/Affiliation: <i>[Signature]</i>		Date: <i>5-31-18</i>	Time: <i>1:50</i>	Received by/Affiliation: <i>Raunel Morado</i>		Date: <i>5/31/18</i>	Time: <i>1:50</i>	
Method of Shipment: <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Bus <input type="checkbox"/> Fed Ex <input type="checkbox"/> DHL <input type="checkbox"/> UPS <input type="checkbox"/> Client <input type="checkbox"/> Other Tracking # _____								
Comments:								
COC Rev. 3.1								

APPENDIX B
RAW DATA SHEETS

BIO-ANALYTICAL LABORATORIES
ACUTE TOXICITY TEST WATER QUALITY DATA

Project# XU007

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 5/31/17 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
15370	8.2/100	110/75.5	40.01	NO	6.0	N/A	72.0	80.0	mv
15371	8.4/103	162.9/95.8	40.01	↓	6.0	↓	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#: 6A1 B2A-410	Species: P.promelas ID#: ECT 913	Species: ID#:	Species: ID#:
Age	< 24 hours	052818 / 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	good EDW 6/2/18	Poor EDW 6/2/18		

Comments:

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

Project# X6707
 Client Camden Water Utilities

Test started: Date 5/31/18 Time 1330
 Test ended: Date 6/1/18 Time 1244

Sample Description 002 Test Species D. pulex ID# 021 129-240
 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
0/0																											
0.5	1	N/A	8	8	8			26.3	27.1	24.4			7.4	7.8			7.6	7.1			22.2	22.6	24.3				
	2	}	8	8	8			/	/	/			/	/			/	/			/	/	/				
	3		8	8	8			/	/	/			/	/			/	/			/	/	/				
	4		8	8	8			/	/	/			/	/			/	/			/	/	/				
	5		8	8	8			/	/	/			/	/			/	/			/	/	/				
12.0	1			8	8	8			27.6	26.9	24.4			7.4	7.7			7.3	7.1			21.6	21.8	22.1			
	2	}	8	8	8			/	/	/			/	/			/	/			/	/	/				
	3		8	8	7			/	/	/			/	/			/	/			/	/	/				
	4		8	8	8			/	/	/			/	/			/	/			/	/	/				
	5		8	8	8			/	/	/			/	/			/	/			/	/	/				
Chemistry Team prerenewal/postrenewal			m EDW EDW					m EDW EDW					m EDW EDW					m EDW EDW									

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

Project# X16707
 Client Camden Water Utilities

Test started: Date 5/21/8 Time 1330
 Test ended: Date 6/2/8 Time 1244

Sample Description 002 Test Species Doulex ID# BAL
 Technician: Ohour EDW 24hour EDW 48hour EDW 72hour _____ 96hour _____
 Time: Ohour 1330 24hour 1030 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																											
16.0	1	UA	8	8	8			27.2	27.6	27.4			7.4	7.4	7.5			7.3	7.0	7.1			27.0	27.2	27.0		
	2	}	8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	3		8	8	7			/	/	/			/	/	/			/	/	/			/	/	/		
	4		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	5		8	8	6			/	/	/			/	/	/			/	/	/			/	/	/		
21.0	1			8	8	8			27.3	27.0	27.5			7.4	7.4	7.6			7.3	7.1	7.1			27.3	27.1	27.0	
	2	}	8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	3		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	4		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	5		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
Chemistry Tech prerenewal/postrenewal								EDW	EDW	EDW			EDW	EDW	EDW			EDW	EDW	EDW			EDW	EDW	EDW		

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

Project# X10707
 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 Doulex ID# DA1
 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
28.0	1	UIA	8	8	8			27.7	27.8	24.5			7.4	7.2	7.5			7.4	7.3	7.2			353	353	337		
	2	)	8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	3		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	4		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	5		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
37.0	1			8	8	8			27.7	26.6	24.5			7.4	7.1	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					MV EDW EDW					MV EDW EDW					MV 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:

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

Project# X6707

Test started: Date 5/31/08 Time 1100

Client Camden Water Utilities

Test ended: Date 6/2/08 Time 1310

Sample Description 002

Test Species P. promelas ID# 001 ECT 05128118

Technician: 0hour mv 24hour mv 48hour epw 72hour _____ 96hour _____

Time: 0hour 1400 24hour 1230 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 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						25.3	24.7	24.1					7.4	7.4	7.1					27.3	26.2	25			
	2	}	8	8	8						/	/	/					/	/	/					/	/	/			
	3		8	8	7						/	/	/					/	/	/					/	/	/			
	4		8	8	8						/	/	/					/	/	/					/	/	/			
	5		8	8	6						/	/	/					/	/	/					/	/	/			
12.0	1			8	8	8						27.4	24.7	24.1					7.4	7.4	7.1					27.3	26.2	25		
	2	}	8	8	8						/	/	/					/	/	/					/	/	/			
	3		8	8	8						/	/	/					/	/	/					/	/	/			
	4		8	8	8						/	/	/					/	/	/					/	/	/			
	5		8	8	8						/	/	/					/	/	/					/	/	/			
	5			8	8	8						/	/	/					/	/	/					/	/	/		

Chemistry Tech
prerenewal/postrenewal

mv mv epw

mv mv epw

mv mv epw

mv mv epw

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

Project# X1001
 Client Camden Water Utilities

Test started: Date 5/31/8 Time 1400
 Test ended: Date 6/2/8 Time 1310

Sample Description 002 Test Species P. promelas ID# 1074 FOT MS 31318 052718
 Technician: 0hour MV 24hour MV 48hour EDW 72hour _____ 96hour _____
 Time: 0hour 1400 24hour 220 48hour 1310 72hour _____ 96hour _____
 Temperature (°C): 0hour 25.1 24hour 24.1 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	DIE DUE DUE DUE DUE					7.4 7.4 7.4 7.4 7.4					7.4 7.4 7.4 7.4 7.4					7.3 7.3 7.3 7.3 7.3					25.3 25.3 25.3 25.3 25.3												
	2		8	8	8																																	
	3		8	8	8																																	
	4		8	8	8																																	
	5		8	8	8																																	
21.0	1		8	8	8	DIE DUE DUE DUE DUE					7.4 7.4 7.4 7.4 7.4					7.4 7.4 7.4 7.4 7.4					7.3 7.3 7.3 7.3 7.3					25.3 25.3 25.3 25.3 25.3												
	2		8	8	8																																	
	3		8	8	7																																	
	4		8	8	8																																	
	5		8	8	8																																	
Chemistry Tech prerenewal/postrenewal			MVA EDW					MVA EDW					MVA EDW					MVA EDW																				

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

Project# K1707
 Client Camden Water Utilities

Test started: Date 5/31/18 Time 1400
 Test ended: Date 6/2/18 Time 1310

Sample Description 002
 Technician: 0hour mv 24hour mv 48hour EDU 72hour _____ 96hour _____
 Time: 0hour 1400 24hour 220 48hour 1310 72hour _____ 96hour _____
 Temperature (°C): 0hour 25.1 24hour 24.7 48hour 25.3 72hour _____ 96hour _____

Test Species P. promelas ID# 218 for 052718

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	UA	8	8	8																										
	2	)	8	8	8																									
	3		8	8	8																										
	4		8	8	8																										
	5		8	8	8																										
37.0	1		8	8	8																										
	2	)	8	8	8																									
	3		8	8	8																										
	4		8	8	7																										
	5		8	8	8																										
Chemistry Tech prerenewal/postrenewal			muller EDU					muller EDU					muller EDU					muller EDU													

X10151

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:

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:

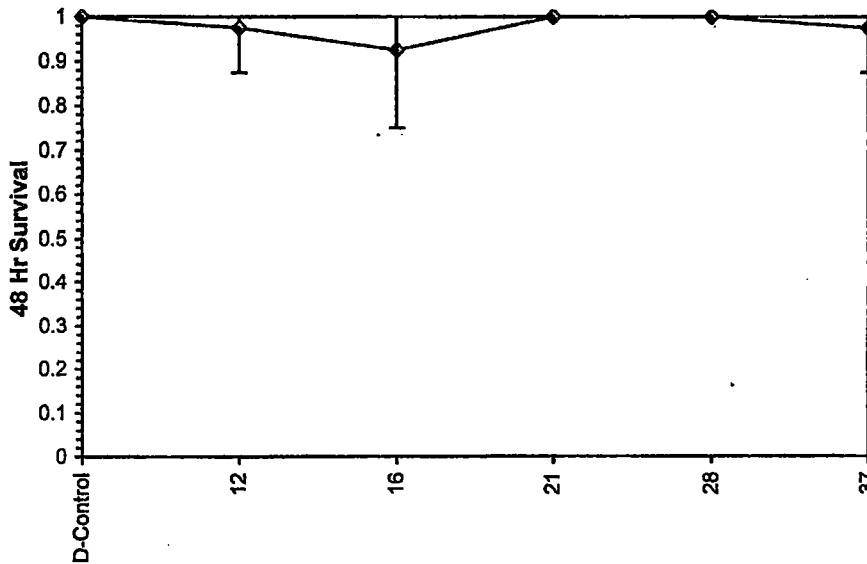
Conc-%	1	2	3	4	5
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000
12	1.0000	1.0000	0.8750	1.0000	1.0000
16	1.0000	1.0000	0.8750	1.0000	0.7500
21	1.0000	1.0000	1.0000	1.0000	1.0000
28	1.0000	1.0000	1.0000	1.0000	1.0000
37	1.0000	1.0000	1.0000	0.8750	1.0000

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root				N	Rank Sum	1-Tailed Critical
			Mean	Min	Max	CV%			
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 ($p \leq 0.05$)	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



Test: DA-Daphnid Acute Test
 Species: DP-Daphnia pulex
 Sample ID: AR0022365
 Start Date: 5/31/2018 End Date: 6/2/2018
 Test ID: X6707DP
 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	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:

EDW
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

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root				N	Rank Sum	1-Tailed Critical
			Mean	Min	Max	CV%			
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

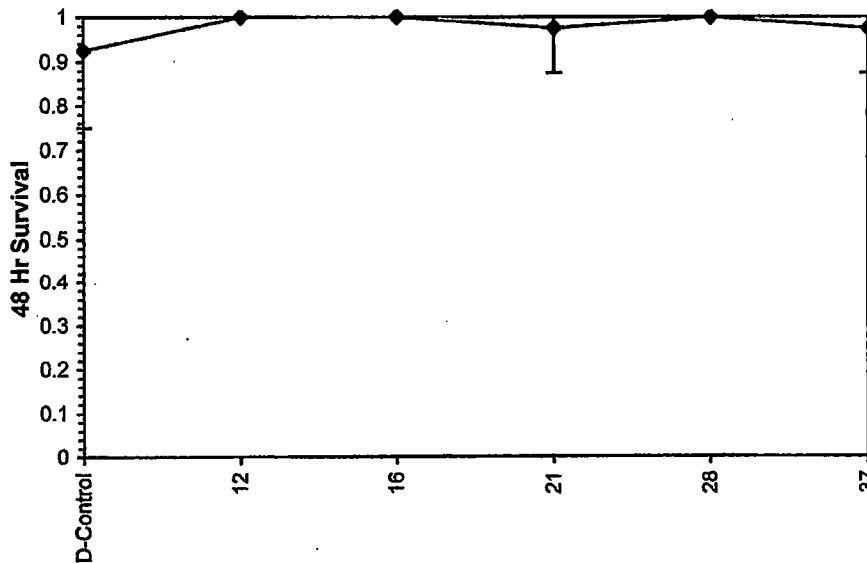
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution ($p \leq 0.05$)	0.76927	0.927	-1.6354	3.95621

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



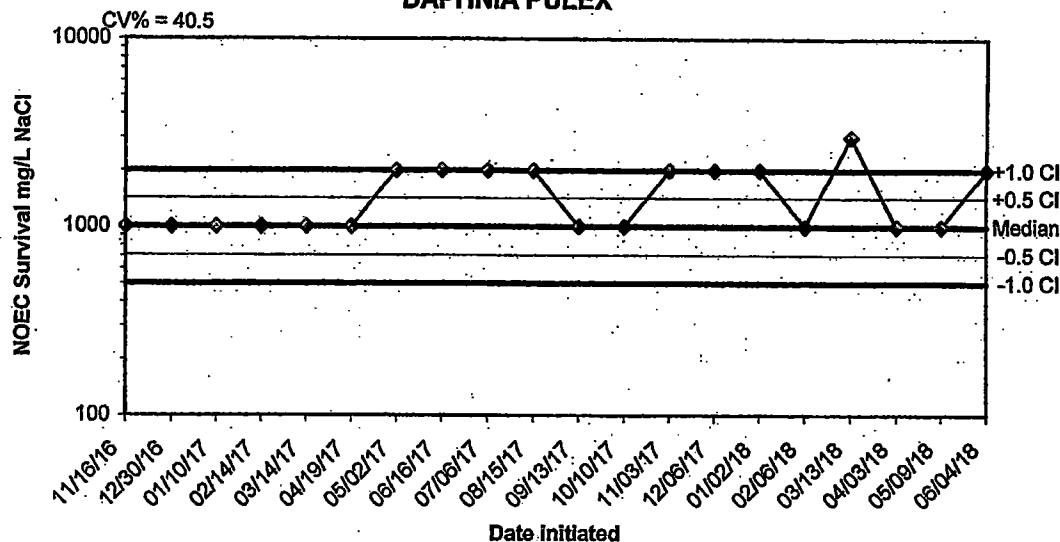
Test: AC-Acute Fish Test Species: PP-Pimephales promelas Sample ID: AR0022365 Start Date: 5/31/2018	Test ID: X6707PP Protocol: EPAAW02-EPA/821/R-02-012 Sample Type: EFF1-POTW Lab ID: ADEQ880630 End Date: 6/2/2018
--	--

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:

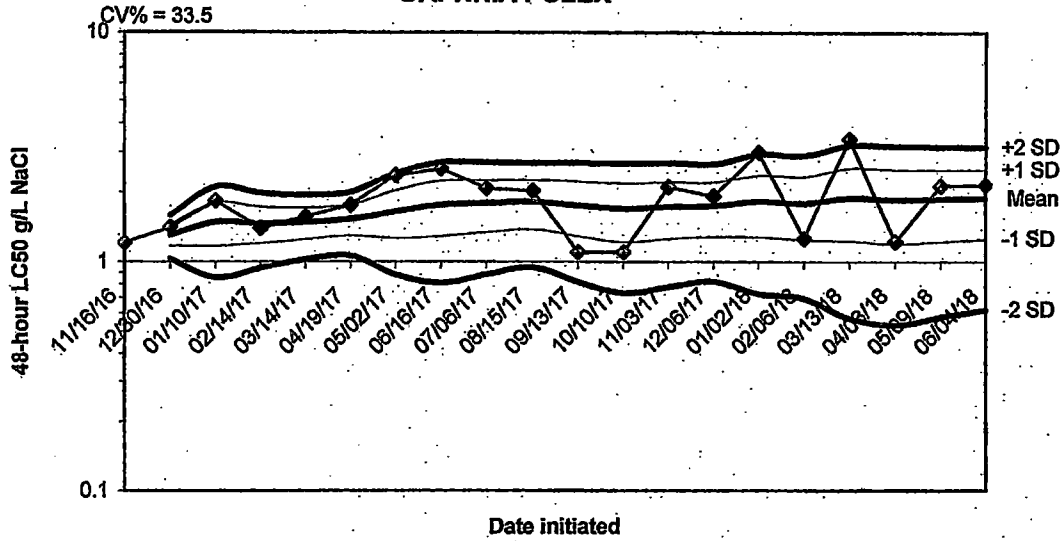
APPENDIX D
QUALITY ASSURANCE CHARTS

**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

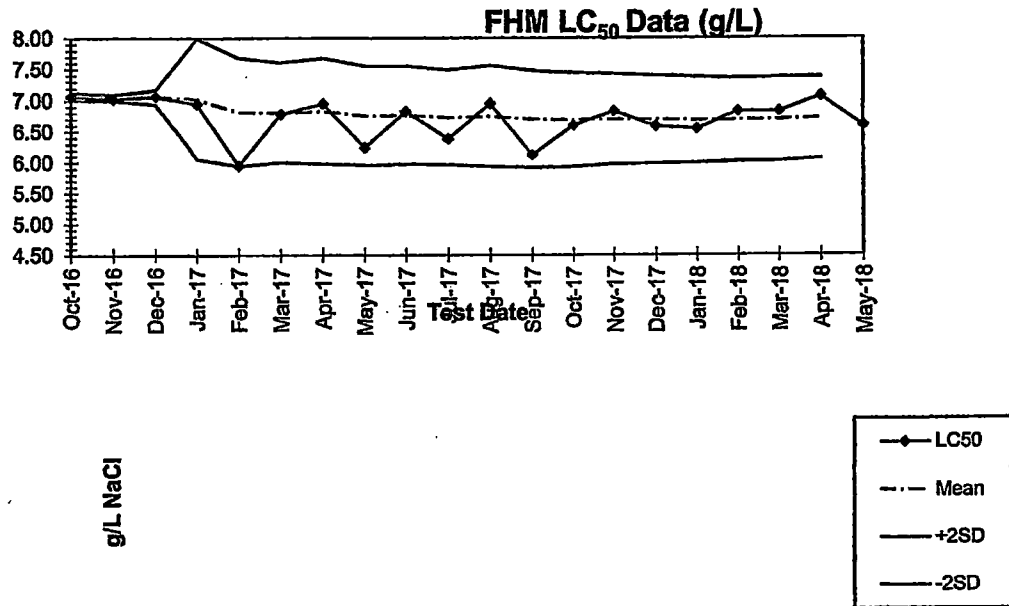
**2018 48 HOUR ACUTE REFERENCE TOXICANT TEST RESULTS FOR
DAPHNIA PULEX**



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	6.04	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.) 1/2 LOW FLOW OR 2X CRITICAL DILUTION (N/A %) YES NO

2. Enter percent effluent corresponding to the LC₅₀ below:

LC₅₀ = >37.0% effluent

95 % confidence limits: N/A

Method of LC₅₀ 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 CaCO₃ 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.) **1/2 LOW FLOW OR 2X CRITICAL DILUTION (N/A %)** **YES** **NO**

2. Enter percent effluent corresponding to the LC₅₀ below:

LC₅₀ = **>37.0% effluent**

95 % confidence limits: N/A

Method of LC₅₀ 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

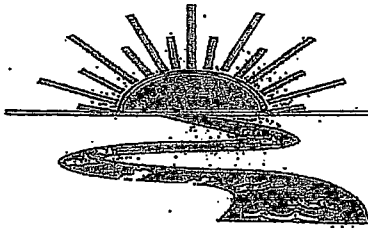
Biomonitoring
Pimephales promelas 48 hour Acute Static Renewal
Chemical Parameters Chart*

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 CaCO₃ on 100% effluent.

APPENDIX F
REPORT QUALITY ASSURANCE FORM



Bio-Analytical Laboratories

3240 Spurgin Road
Post Office Box 527
Doyline, LA 71028

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

REPORT QUALITY ASSURANCE FORM

Client: Camden Water Utilities

Project#: X6707

Chain of Custody Documents Checked by: Emj More 6/4/18
Technician/Date

Raw Data Documents Checked by: Emj More 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.

Kevin J. Baupp, BS 6-12-18
Quality Manager Date

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



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

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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 (LC₅₀), 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^o 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^o 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 CaCO₃ 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^o 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 LC₅₀ values were also obtained using the ToxCalc program.

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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 LC₅₀ 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	
	<i>D. pulex</i>	<i>P.promelas</i>
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.

BAL
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

3240 Spangin Road
Post Office Box 627
Doyline, LA 71023

(318) 746-2772
1-800-259-4248
Fax: (318) 746-2773

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

Laboratory Use Only:

Company: Camden Water Utilities		Phone: (870) 836-4329		Analysis: Chronic Ceriodaphnia Chronic minnow Acute minnow (fresh/marine) Acute Daphnia species Acute Mysid Acute Ceriodaphnia Fecal Coliform				Project Number: X6785 Temp. upon arrival: 1.3 Therm#: 29 Color: clear Odor: none Tech: EDW Preservative: (below)
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:								
Date Start Date End	Time Start Time End	C	G	# and type of container	Sample Identification	Lab Control Number:		
8-13-18 8-14-18	8:00 Am 8:00 Am	X		2 half gallons	002- Day 1	C15768		
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 AM	Received by/Affiliation: [Signature]	Date: 8-15-18	Time: 9:36
Relinquished by/Affiliation:				Date:	Time:	Received by/Affiliation:	Date:	Time:
Relinquished by/Affiliation: [Signature]				Date: 8-15-18	Time: 12:15	Received by/Affiliation: Enid Moore	Date: 8/15/18	Time: 12:15
Method of Shipment: <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Bus <input type="checkbox"/> Fed Ex <input type="checkbox"/> DHL <input type="checkbox"/> UPS <input type="checkbox"/> Client <input type="checkbox"/> Other Tracking # _____								
Comments:								
COC Rev. 3.1								

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

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

EDW
8/15/18

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
C5768	8.4/99.1	NO	<0.01	NO	0.5	N/A	44.0	44.0	EDW
C5769	8.1/91.2	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	2252					7.7	50.0	28.0	EDW

Test Species Information

Test Species Info.	Species: D.pulex ID#: BAL 010-18	Species: P.promelas ID#: BAL 008-18	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 15m shells	Fair 15m shells		

Comments:

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

Project# X6785

Test started: Date 8/15/18 Time 1326

Client Camden

Test ended: Date 8/17/18 Time 1245

Sample Description 002

Test Species D. pulex ID# BAL 06-F8

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

Time: 0hour 1330 24hour 1020 48hour 1045 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	
05	1	n/a	8	8	7			28.4	25.3	25.0			7.2	7.0	7.0			6.4	6.2	6.4			191.0	197	193			201
	2		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/			/
	3		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/			/
	4		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/			/
	5		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/			/
12	1		8	8	7			27.8	25.3	25.0			7.3	7.9	8.0			6.6	6.8	6.8			208	208	208			216
	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										

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

Project# X6785

Test started: Date 8/15/18

Time 1326

Client Oraniden

Test ended: Date 8/17/18

Time 1205

Sample Description 002

Test Species D. pulex

ID# SM 06-P8

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

Time: 0hour 1326 24hour 1000 48hour 1205 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
10	1	n/a	8	7	7			27.7	28.5	27.7	28.1		7.3	7.6	8.0			6.8	6.9	6.9			11.0	11.0	11.0		
	2		8	8	6			/	/	/	/		/	/	/			/	/	/			/	/	/		
	3		8	8	8			/	/	/	/		/	/	/			/	/	/			/	/	/		
	4		8	8	7			/	/	/	/		/	/	/			/	/	/			/	/	/		
	5		8	7	7			/	/	/	/		/	/	/			/	/	/			/	/	/		
21	1	n/a	8	8	8			27.0	27.0	27.0	27.0		7.4	7.7	7.9			7.0	7.0	7.0			11.0	11.0	11.0		
	2		8	8	5			/	/	/	/		/	/	/			/	/	/			/	/	/		
	3		8	8	6			/	/	/	/		/	/	/			/	/	/			/	/	/		
	4		8	8	7			/	/	/	/		/	/	/			/	/	/			/	/	/		
	5		8	8	8			/	/	/	/		/	/	/			/	/	/			/	/	/		
Chemistry Test prerenewal/postrenewal																											

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

Project# X6785

Test started: Date 8/15/18 Time 1326

Client Camden

Test ended: Date 8/17/18 Time 1245

Sample Description OPA

Test Species D. pulex ID# BA06-P8

Technician: 0hour SM 24hour SM 48hour SM 72hour _____ 96hour _____

Time: 0hour 1326 24hour 1020 48hour 1045 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
6		N/A																									
28	1		8	8	7			7.1	7.5	7.5			7.5	7.7	7.9			7.0	7.1	7.1			7.0	7.1	7.1		
	2		8	8	8																						
	3		8	8	7																						
	4		8	8	7																						
	5		8	8	7																						
37	1		8	8	7			7.6	7.8	7.8			7.6	7.8	7.9			7.0	7.1	7.1			7.0	7.1	7.1		
	2		8	8	7																						
	3		8	8	8																						
	4		8	8	6																						
	5		8	8	8																						
Chemistry Tech prerenewal/postrenewal																											

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. 2.4)

Project# X6785

Test started: Date 8/15/8 Time 1403

Client Camden

Test ended: Date 8/17/8 Time 1310

Sample Description 002

Test Species P. promelas ID# BAL080818

Technician: Onhour EDW 24hour EDW 48hour EDW 72hour _____ 96hour _____
 Time: Onhour 1400 24hour 1400 48hour 1310 72hour _____ 96hour _____
 Temperature (°C): Onhour 25.4 24hour 24.9 48hour 23.3 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
90		N/A																									
0.5	1		8	8	7			28.4	24.3	27.8	24.3	7.2	7.4	5.0			6.4	6.4	6.4			19.5	23.4	27.3	26.1		
	2		8	8	6			/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	
	3		8	8	8			/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	
	4		8	8	7			/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	
	5		8	8	8			/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	
12	1		8	8	8			27.8	24.3	27.4	24.3	7.3	7.4	7.0			6.6	6.4	6.6			22.8	23.3	23.4	23.1		
	2		8	7	7			/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	
	3		8	8	8			/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	
	4		8	8	6			/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	
	5		8	8	8			/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	/	
Chemistry Tech pre renewal/post renewal			EDW					EDW					EDW					EDW									

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.4)

Project# X6785

Test started: Date 8/15/8 Time 1403

Client Camden

Test ended: Date 8/17/8 Time 1310

Sample Description 002

Test Species P. promelas ID# BA080818

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

Time: 0hour 1403 24hour 0400 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
10	1	n/a	8	6	4			27.7	24.9	24.3			7.3	7.6	7.9			6.8	6.4	6.8			211	203	200		
	2		8	8	7			/	/	/			/	/	/			/	/	/			/	/	/		
	3		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	4		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	5		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
21	1		8	8	8			27.7	24.1	24.3			7.4	7.7	7.8			7.0	6.5	6.9			217	210	205		
	2		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	3		8	7	5			/	/	/			/	/	/			/	/	/			/	/	/		
	4		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	5		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
Chemistry Test prerenewal/postrenewal								EDW EDW EDW EDW EDW										EDW EDW EDW EDW EDW									

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA (ACUTE2 REV. 2.1)

Project# X6785

Test started: Date 8/15/8 Time 1403

Client Camden

Test ended: Date 8/17/8 Time 1310

Sample Description 002

Test Species P. promelas ID# BAL080816

Technician: 0hour EDW 24hour EM 48hour EM 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				
			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	5			27.0	24.1	24.3			7.5	7.7	7.7			7.0	6.9	6.9			22.9	22.3	21.6		
	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	24.4			7.6	7.8	7.5			7.0	6.9	7.0			22.5	21.6	21.6		
	2		8	8	7			/	/	/			/	/	/			/	/	/			/	/	/		
	3		8	7	7			/	/	/			/	/	/			/	/	/			/	/	/		
	4		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
	5		8	8	8			/	/	/			/	/	/			/	/	/			/	/	/		
Chemistry Tech prerenal/postrenal			EDW					EDW					EDW					EDW									

Fish Acute 8/13/18

X6785
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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:

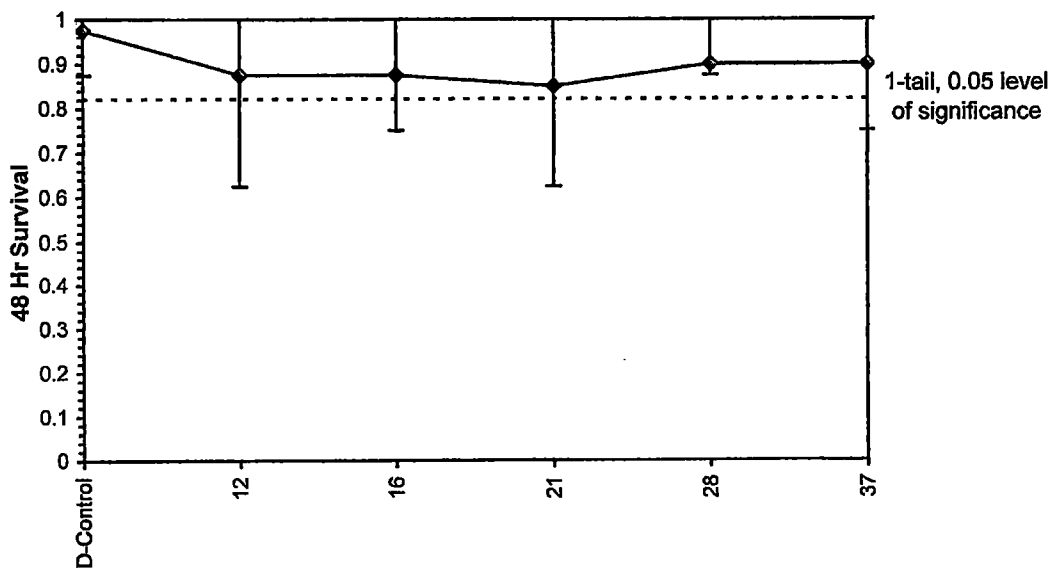
Conc-%	1	2	3	4	5
D-Control	0.8750	1.0000	1.0000	1.0000	1.0000
12	0.8750	1.0000	0.8750	0.6250	1.0000
16	0.8750	0.7500	1.0000	0.8750	0.8750
21	1.0000	0.6250	0.7500	0.8750	1.0000
28	0.8750	1.0000	0.8750	0.8750	0.8750
37	0.8750	0.8750	1.0000	0.7500	1.0000

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root					N	t-Stat	1-Tailed Critical	MSD
			Mean	Min	Max	CV%					
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	37	>37		2.7027	0.13407	0.14043	0.01678	0.0223	0.59226	5, 24

Treatments vs D-Control

Dose-Response Plot



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:

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

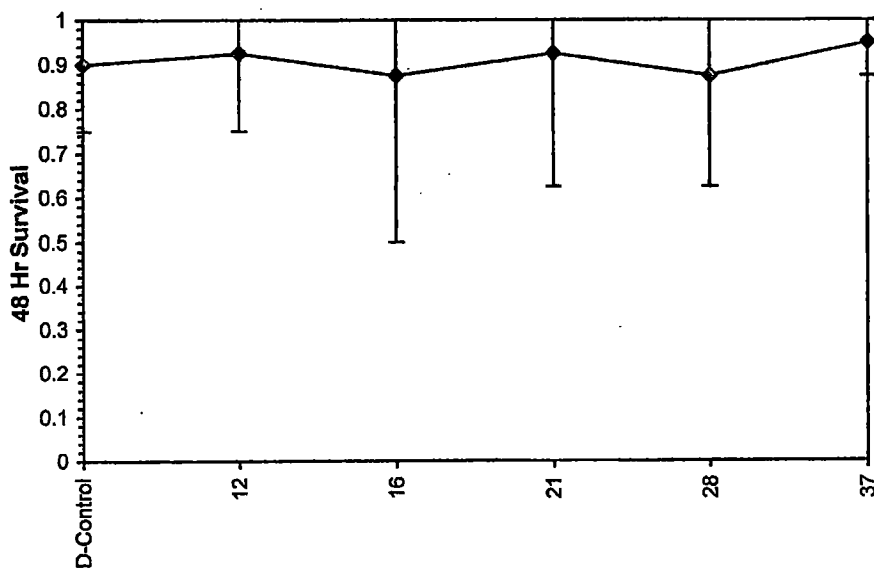
Comments:

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

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root				Rank Sum	1-Tailed Critical
			Mean	Min	Max	CV%		
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	0.8750	0.9722	1.2348	0.7854	1.3931	21.341	5	29.00
21	0.9250	1.0278	1.2968	0.9117	1.3931	16.600	5	31.00
28	0.8750	0.9722	1.2234	0.9117	1.3931	16.097	5	27.00
37	0.9500	1.0556	1.3196	1.2094	1.3931	7.623	5	31.00

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

Dose-Response Plot



Test: AC-Acute Fish Test
 Species: PP-Pimephales promelas
 Sample ID: AR0022635
 Start Date: 8/15/2018 End Date: 8/17/2018

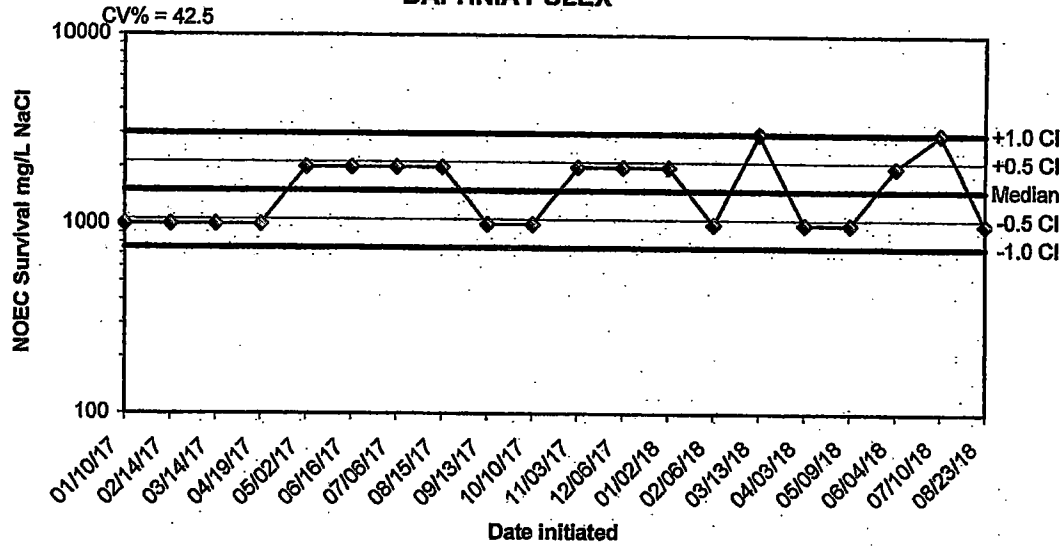
Test ID: X6785PPA
 Protocol: EPAAW02-EPA/821/R-02-012
 Sample Type: EFF1-POTW
 Lab ID: ADEQ880630

Pos	ID	Rep	Group	Start	24 Hr	48 Hr	72 Hr	96 Hr	Notes
	1	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:

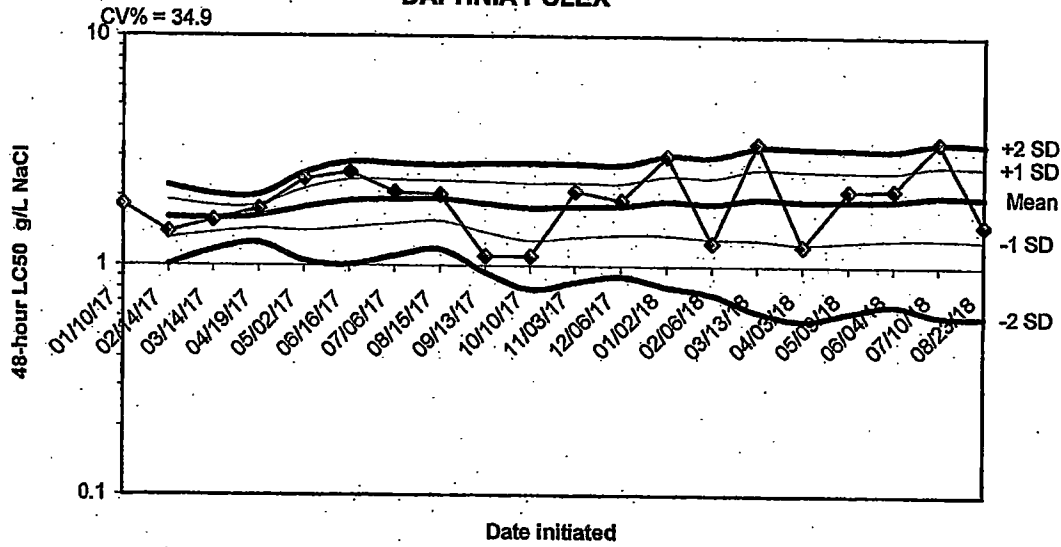
APPENDIX D
QUALITY ASSURANCE CHARTS

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



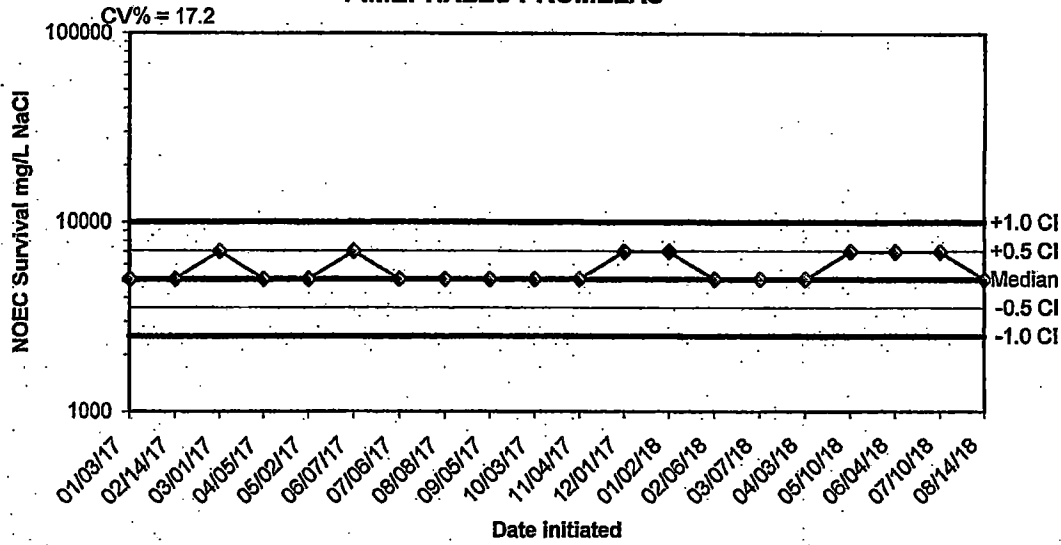
Dates	Values	Median	-0.5 CI	-1.0 CI	+0.5 CI	+1.0 CI
01/10/17	1000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
02/14/17	1000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
03/14/17	1000.0000	1500.0000	1060.6602	750.0000	2121.3203	3000.0000
04/19/17	1000.0000	1500.0000	1060.6602	750.0000	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**



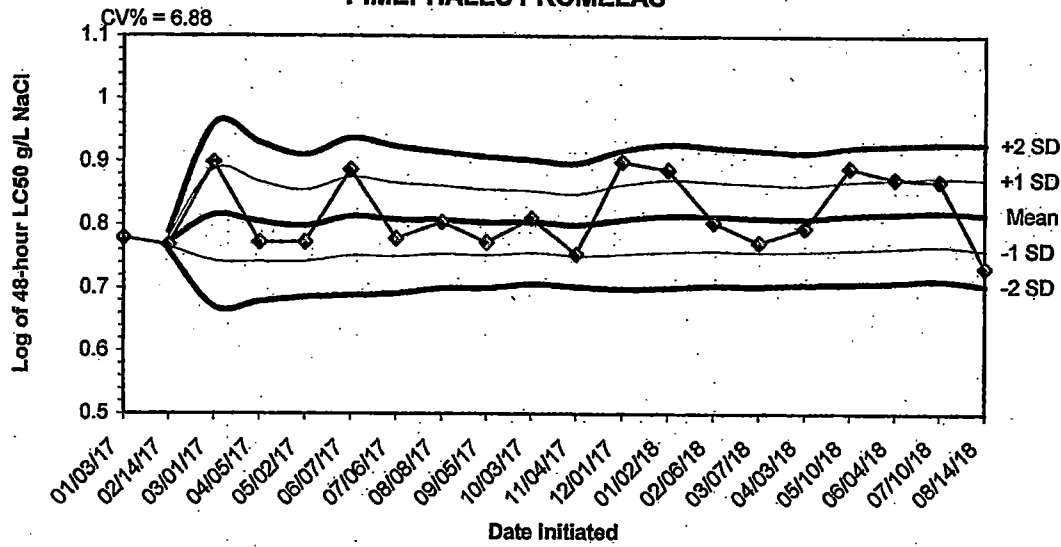
Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
01/10/17	1.8300					
02/14/17	1.4000	1.6150	1.3109	1.0069	1.9191	2.2231
03/14/17	1.5700	1.6000	1.3834	1.1669	1.8166	2.0331
04/19/17	1.7569	1.6392	1.4458	1.2523	1.8327	2.0261
05/02/17	2.3750	1.7864	1.4171	1.0479	2.1556	2.5249
06/16/17	2.5400	1.9120	1.4606	1.0093	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.) **1/2 LOW FLOW OR 2X CRITICAL DILUTION (N/A%)** **YES** **NO**

2. Enter percent effluent corresponding to the LC₅₀ below:

LC₅₀ = **>37.0% effluent**

95 % confidence limits: N/A

Method of LC₅₀ 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 CaCO₃ 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.) **1/2 LOW FLOW OR 2X CRITICAL DILUTION (N/A%)** YES NO

2. Enter percent effluent corresponding to the LC₅₀ below:

LC₅₀ = >37.0% effluent

95 % confidence limits: N/A

Method of LC₅₀ 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

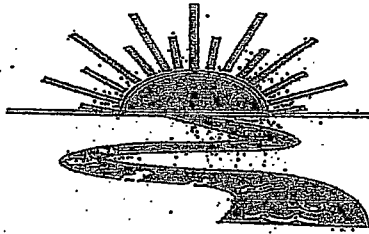
Biomonitoring
Pimephales promelas 48 hour Acute Static Renewal
Chemical Parameters Chart*

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 CaCO₃ on 100% effluent.

APPENDIX F
REPORT QUALITY ASSURANCE FORM



Bio-Analytical Laboratories

3240 Spurgeon Road
Post Office Box 527
Doyline, LA 71028

(318) 746-2772
1-800-263-1246
Fax (318) 746-2773

REPORT QUALITY ASSURANCE FORM

Client: Camden Water Utilities

Project#: X6785

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

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

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

Quality Control Data Checked by: EOB 9/6/18
Quality Manager/Date

Report Checked by: EOB 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 J. Bragg, BS 9/10/18
Quality Manager Date

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



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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**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

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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 (LC₅₀), 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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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^o 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^o 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 CaCO₃ 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^o 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 LC₅₀ 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 LC₅₀ 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	
	<i>D. pulex</i>	<i>P.promelas</i>
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

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(318) 745-2772
1-800-239-1248
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 Temp. upon arrival: 0.4/0.5 Therm#: #29 Color: Clear/clear Odor: None/None Tech: BOU 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	Lab Control Number:					
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				
11-26-18 8-26-18	8:00 AM			2 half gallons	002- Day 1		X	X			C16280	ICE					
11-27-18 8-27-18	8:00 AM	X		2 half gallons	002- Day 2		X	X			C16281	ICE					
11-27-18 8-27-18	8:00 AM	X		2 half gallons	002- Day 2		X	X			C16281	ICE					
11-28-18 8-28-18	8:00 AM	X		2 half gallons	002- Day 2		X	X			C16281	ICE					
Relinquished by/Affiliation: <i>Annette Strickland</i>		Date: 11-28-18	Time: 10:50 AM	Received by/Affiliation: <i>Alisha Rodenkovich</i>		Date: 11-28-18	Time: 10:50 AM										
Relinquished by/Affiliation: <i>Alisha Rodenkovich</i>		Date: 11-28-18	Time: 2:00 PM	Received by/Affiliation: <i>Erin Brieger</i>		Date: 11/28/18	Time: 1406										
Relinquished by/Affiliation:		Date:	Time:	Received by/Affiliation:		Date:	Time:										
Method of Shipment: <input type="checkbox"/> Lab <input type="checkbox"/> Bus <input type="checkbox"/> Fed Ex <input type="checkbox"/> DHL <input type="checkbox"/> UPS <input type="checkbox"/> Client <input type="checkbox"/> Other Tracking # _____																	
Comments:																	
COC Rev. 3.1 → BOU 11/28/18																	

11-26-18
11-27-18
11-27-18
11-28-18
BOU 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	9.2/100%	16/8.1/95.6%	<0.01	NO	0	N/A	40	12	EDW
C16281	9.3/115.3%	16/7.1/96.2%	↓	↓	↓	↓	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#: <u>BAL0A1-F23</u>	Species:P.promelas ID#: <u>BAL111S18</u>	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?	<u>None</u>	<u>None</u>		
Amount	↓	↓		
Condition of survivors	<u>Great EDW 11/30/18</u>	<u>Fair EDW 11/30/18</u>		

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

Project# XU879

Test started: Date 11/28/18 Time 1540

Client Camden

Test ended: Date 11/30/18 Time 1445

Sample Description 002

Test Species D. DULOX

TD# D21-F23 BAL

Technician: 0hour ED 24hour ED 48hour EDW 72hour _____ 96hour _____
 Time: 0hour 1540 24hour 1955 48hour 1445 72hour _____ 96hour _____
 Temperature (°C): 0hour 25.0 24hour 25.2 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						
10		NA																										
0s	1		8	8	8			25.1	25.2	23.8			7.7	8.0			7.4	7.0			202	203			202	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	25.2	23.3			7.7	7.9			7.4	7.0			219	220			219	220	203	
	2		8	8	8																							
	3		8	8	8																							
	4		8	8	8																							
	5		8	8	8																							
Chemistry Water pre-renewal/post-renewal								EDW	EDW			EDW	EDW			EDW	EDW			EDW	EDW			EDW	EDW			

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

Project# X10879
 Client Camden

Test started: Date 1/28/18 Time 1840
 Test ended: Date 1/30/18 Time 1445

Sample Description 002 Test Species D. Dux ID# 021-F33-BAL
 Technician: 0hour EDW 24hour EDW 48hour EDW 72hour _____ 96hour _____
 Time: 0hour 1540 24hour 1555 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				
			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
70		N/A																									
16	1		8	8	8			25.1	23.7	23.4			75	79	76			73	70	70			218	220	220		
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
21	1		8	8	8			25.1	23.7	23.4			76	79	78			73	70	71			220	222	223		
	2		8	6	5																						
	3		8	6	6																						
	4		8	8	8																						
	5		8	8	8																						
Chemistry used			pre-renewal/post-renewal					EDW					EDW					EDW					EDW				

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

Project# X6879
 Client Camden

Test started: Date 11/28/88 Time 1540
 Test ended: Date 11/30/88 Time 1445

Test Species D. Pulex ID# DR1-F23.3A
 72hour _____ 96hour _____
 72hour _____ 96hour _____

Sample Description _____
 Technician: _____
 Time: _____
 Temperature (°C): _____

0hour 80 24hour 80 48hour 80
 72hour _____ 96hour _____
 0hour 15.0 24hour 15.5 48hour 14.5
 72hour _____ 96hour _____
 0hour 25.0 24hour 25.2 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					
90		n/a																														
28	1		8	8	8			5.1	7.5	7.8			7.6	7.8			7.3	7.1					25	25								
	2		8	8	8																											
	3		8	8	8																											
	4		8	8	8																											
	5		8	8	8																											
37	1		8	8	8			5.1	7.5	7.8			7.7	7.7			7.3	7.1					23.6	25.4								
	2		8	8	8																											
	3		8	7	7																											
	4		8	7	7																											
	5		8	8	8																											
Chemistry Test																																
pre-renewal/post-renewal																																

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

Test started: Date 11/28/18 Time 11:10

Client Camden

Test ended: Date 11/30/18 Time 5:25

Sample Description 002

Test Species P. promelas ID# 11518 BAC

Technician: 0hour BOJ 24hour BOJ 48hour EOU

72hour _____ 96hour _____

Time: 0hour 16.0 24hour 15.5 48hour 15.3

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				
			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
70		N/A																									
05	1		8	8	8			25.1	25.2	25.3	7.7	7.8	7.9	8.0	7.4	7.5	7.6	202	203	204	205	206	207	208	209	210	
	2		8	8	8																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
12	1		8	8	7			25.1	25.2	25.3	7.7	7.8	7.9	7.4	7.5	7.6	219	220	221	222	223	224	225	226			
	2		8	7	6																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
Chemistry from pre-renewal/post-renewal			EOU					EOU					EOU					EOU									

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

Project# X16879

Test started: Date 11/28/18 Time 1610

Client Camden

Test ended: Date 11/30/18 Time 1523

Sample Description 002

Test Species P. Dromelas ID# 111518 BA

Technician: 0hour ED 24hour ED 48hour ED 72hour _____ 96hour _____

Time: 0hour 1610 24hour 1515 48hour 1523 72hour _____ 96hour _____

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

72hour _____ 96hour _____

72hour _____ 96hour _____

72hour _____ 96hour _____

Test Dilution	Rep.	West Salinity	# Intra 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
90		n/a																									
16	1	1	8	8	8			23.7	23.4			7.5	7.6			7.3	7.0					218	220				
	2	1	8	6	5																						
	3	1	8	6	6																						
	4	1	8	8	8																						
	5	1	8	8	8																						
21	1	1	8	8	8			23.7	23.4			7.6	7.8			7.3	7.1					220	222	233			
	2	1	8	8	8																						
	3	1	8	8	8																						
	4	1	8	8	8																						
	5	1	8	8	8																						
Chemistry from pre renewal / post renewal			EDM					EDM					EDM					EDM									

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

Project# X6879

Test started: Date 11/28/18 Time 1610

Client Camden

Test ended: Date 11/30/18 Time 1523

Sample Description 002

Test Species P. promelas ID# 115183AL

Technician: 0hour BD 24hour BD 48hour BD

72hour _____ 96hour _____

Time: 0hour 1610 24hour 1515 48hour 1523

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				
			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
90		N/A																									
28	1		8	8	8			5.1	5.0	5.4			7.6	7.4	7.6			7.3	7.3	7.1			2.5	2.2	2.2		
	2		8	7	7																						
	3		8	8	8																						
	4		8	8	8																						
	5		8	8	8																						
37	1		8	8	8			5.1	5.0	5.4			7.7	7.4	7.7			7.3	7.3	7.1			2.6	2.4	2.5		
	2		8	8	8																						
	3		8	7	7																						
	4		8	7	7																						
	5		8	8	8																						
Chemistry Test			pre-renewal/post-renewal					EOW					EOW					EOW					EOW				

Test: AC-Acute Fish Test
 Species: PP-Pimephales promelas
 Sample ID: AR0022365
 Start Date: End Date:

Test ID: CMDNPPA
 Protocol: EPAAW02-EPA/821/R-02-012
 Sample Type: EFF2-Industrial
 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

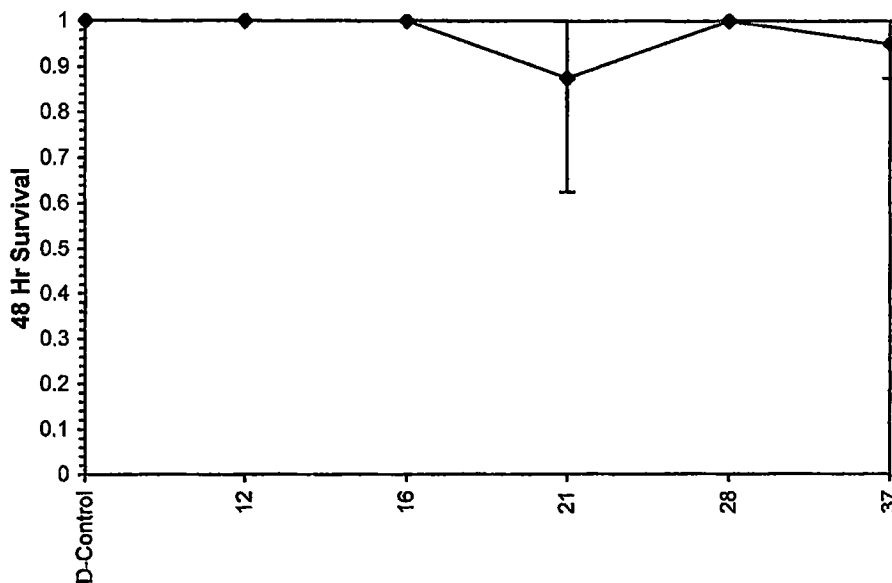
Comments:

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

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root					Rank Sum	1-Tailed Critical
			Mean	Min	Max	CV%	N		
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



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:

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

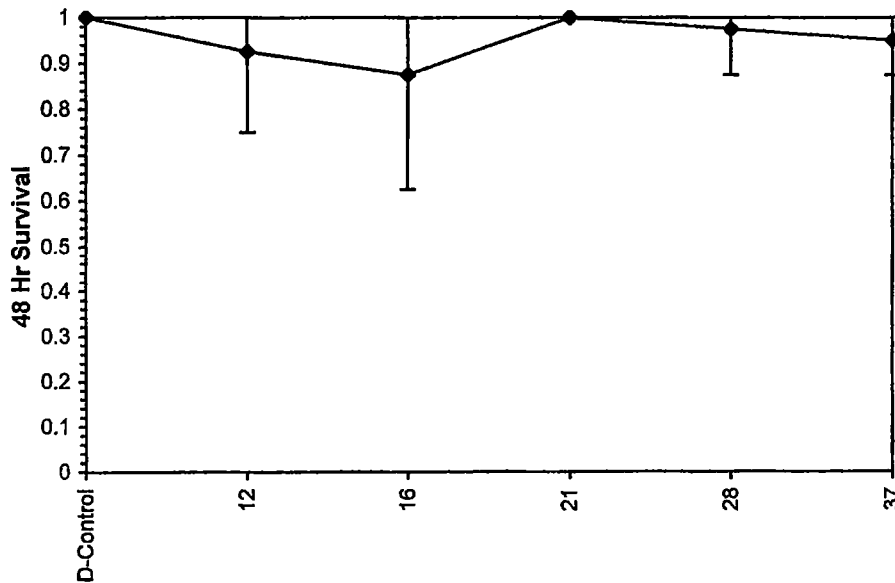
Comments:

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

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root					Rank Sum	1-Tailed Critical
			Mean	Min	Max	CV%	N		
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 ($p \leq 0.05$)	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



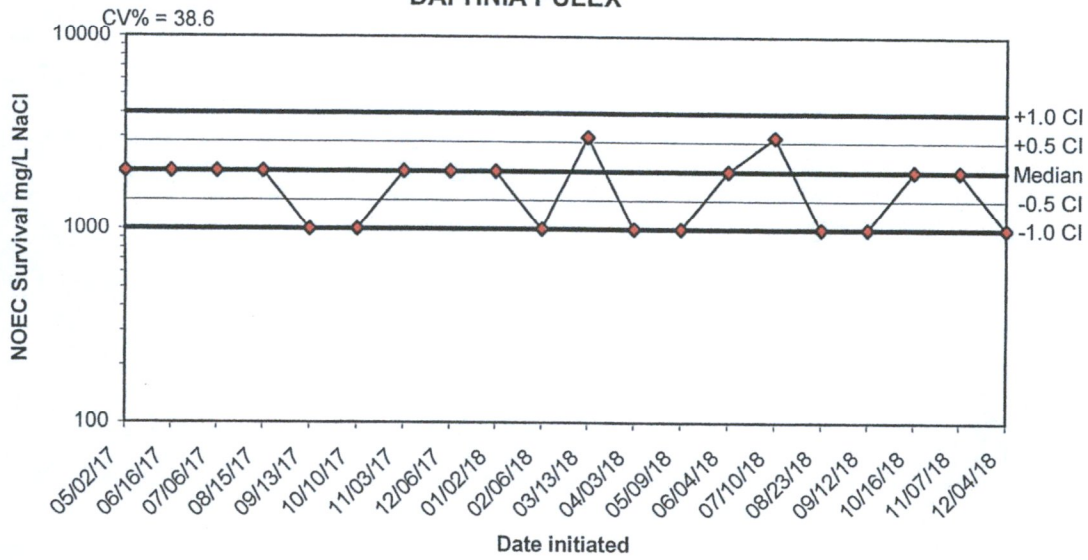
Test: AC-Acute Fish Test Test ID: X6879PP
 Species: PP-Pimephales promelas Protocol: EPAAW02-EPA/821/R-02-012
 Sample ID: AR0022365 Sample Type: EFF1-POTW
 Start Date: 11/28/2018 End Date: 11/30/2018 Lab ID: ADEQ880630

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:

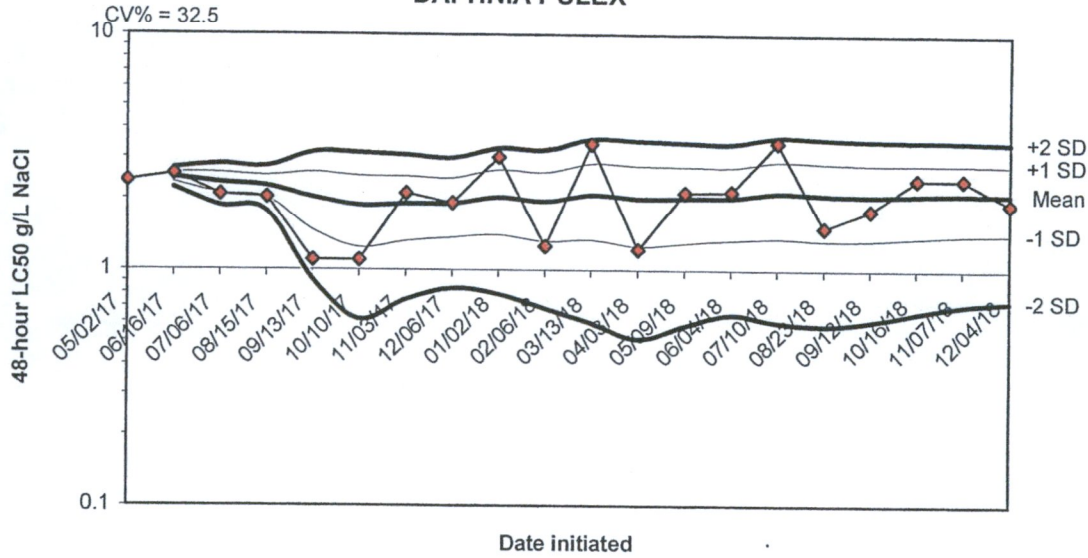
APPENDIX D
QUALITY ASSURANCE CHARTS

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



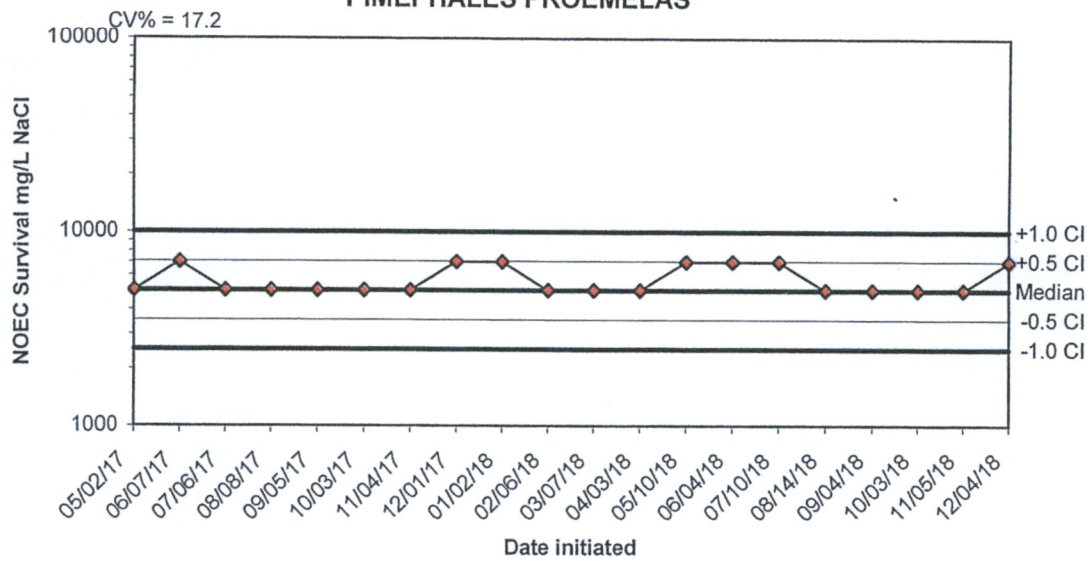
Dates	Values	Median	-0.5 CI	-1.0 CI	+0.5 CI	+1.0 CI
05/02/17	2000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
06/16/17	2000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
07/06/17	2000.0000	2000.0000	1414.2136	1000.0000	2828.4271	4000.0000
08/15/17	2000.0000	2000.0000	1414.2136	1000.0000	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



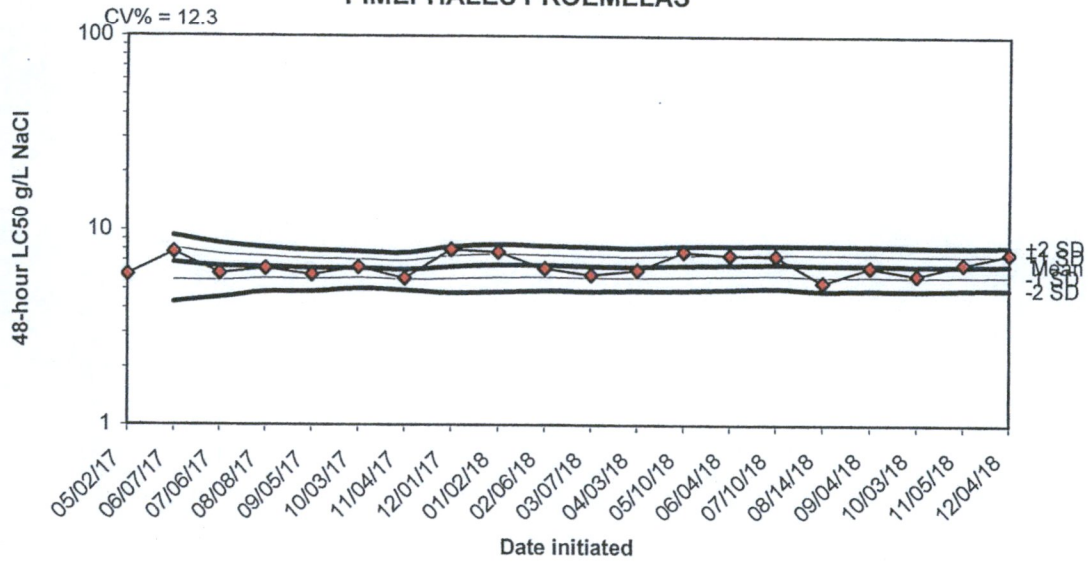
Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
05/02/17	2.3750					
06/16/17	2.5400	2.4575	2.3408	2.2242	2.5742	2.6908
07/06/17	2.0800	2.3317	2.0986	1.8656	2.5647	2.7977
08/15/17	2.0300	2.2563	2.0134	1.7706	2.4991	2.7419
09/13/17	1.1000	2.0250	1.4668	0.9086	2.5832	3.1414
10/10/17	1.0991	1.8707	1.2445	0.6182	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	2.9777
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 LC₅₀ below:

LC₅₀ = >37.0% effluent

95 % confidence limits: N/A

Method of LC₅₀ 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 CaCO₃ 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.) **1/2 LOW FLOW OR 2X CRITICAL DILUTION (N/A%)** YES NO

2. Enter percent effluent corresponding to the LC₅₀ below:

LC₅₀ = >37.0% effluent

95 % confidence limits: N/A

Method of LC₅₀ 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 CaCO₃ 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
1-800-269-1246
Fax: (318) 745-2773

REPORT QUALITY ASSURANCE FORM

Client: Camden Water Utilities

Project#: X6879

Chain of Custody Documents Checked by: Eni Mar 12/14/18
Technician/Date

Raw Data Documents Checked by: Eni Mar 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.

Curtis L. Bepp, BS
Quality Manager

12/26/18
Date

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



Camden Water Utilities
PO Drawer J
Camden, AR 71711



ARKANSAS DEPARTMENT OF ENVIRONMENTAL QUALITY
NPDES ENFORCEMENT DIVISION
5301 NORTH SHORE DRIVE
NORTH LITTLE ROCK, AR 72118-5317

UNITED STATES POSTAL SERVICE

Retail

P

US POSTAGE PAID

\$7.85

Origin: 71701
01/28/19
0414940701-14

PRIORITY MAIL 1-Day®

1 Lb 11.60 Oz

1006

EXPECTED DELIVERY DAY: 01/29/19

R015

SHIP TO:

5301 NORTHSHORE DR
NORTH LITTLE ROCK AR 72118-5328

USPS TRACKING NUMBER



9505 5110 0373 9028 1278 57