

Bio-Analytical Laboratories (BAL)
ADEQ#88-0630
Project X5223

Bio-Analytical Laboratories' Executive Summary

Permittee: Camden Water Utilities
P.O. Drawer J
Camden, AR 71711

Project #: X5223

Outfall: Outfall 002 (treated municipal wastewater)

Permit #: AR0022365/ AFIN 52-00073

Contact: David Richardson

Test Dates: September 25 - 27, 2013

Test Type: 48-hour acute definitive toxicity test using *Daphnia pulex* (EPA 2021.0)
48-hour acute definitive toxicity test using *Pimephales promelas* (EPA 2000.0)

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 for survival, Parameter TOM3D - 37.0%.
3. Report the highest (critical dilution or control) Coefficient of Variation, Parameter TQM3D - 11.68%.

For *Pimephales promelas* (Fathead Minnow):

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 for survival, Parameter TOM6C - 37.0%.
3. Report the highest (critical dilution or control) Coefficient of Variation, Parameter TQM6C - 0.00%.

This report contains a total of 32 pages, including this page. The results pertain only to the samples listed in the chain of custody documents in Appendix A. The information contained within meets the requirements set forth by ADEQ. The chemical results in this report are for monitoring purposes only and should not be included on discharge monitoring reports.



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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

EPA Methods 2000.0 and 2021.0

Project X5223

Test Dates: September 25 - 27, 2013

Report Date: October 3, 2013

Prepared for:
Mr. David Richardson
Camden Water Utilities
P.O. Drawer J
Camden, AR 71711

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ADEQ #88-0630

BAL
ADEQ #88-0630
Project X5223

TABLE OF CONTENTS

1.0 Introduction	4
2.0 Methods and Materials	4
2.1 Test Methods	4
2.2 Test Organisms	4
2.3 Dilution Water	5
2.4 Test Concentrations	5
2.5 Sample Collection	5
2.6 Sample Preparation	5
2.7 Monitoring of the Tests	5
2.8 Data Analysis	6
3.0 Results and Discussion	5
4.0 Conclusions	7
5.0 References	8
Appendices	
A- Chain-of-Custody Documents	9
B- Raw Data Sheets	12
C- Statistical Analysis	20
D- Quality Assurance Charts	23
E- Agency Forms	26
F- Report Quality Assurance Form	31

BAL
ADEQ #88-0630
Project X5223

1.0 Introduction

Bio-Analytical Laboratories (BAL), Doyline, Louisiana conducted two 48-hour acute definitive toxicity tests for Outfall 002 at Camden Water Utilities, Camden, Arkansas. The test organisms used were the cladoceran, *Daphnia pulex*, and the fathead minnow, *Pimephales promelas*. The purpose of this study is to determine if an appropriately dilute effluent sample adversely affects the survival of the test organism. Toxicity is defined as a statistically significant difference at the 95 percent confidence level between the survival of the test organisms in the critical dilution (the effluent concentration representative of the proportion of effluent in the receiving water during critical low flow or critical mixing conditions) compared to the survival of the test organisms in the control. 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 48-hour LC_{50} , the concentration in which 50 percent of the test organisms died.

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).

2.2 Test Organisms

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

BAL
ADEQ #88-0630
Project X5223

2.3 Dilution Water

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

2.4 Test Concentrations

The test concentrations used in the acute toxicity tests were 37.0, 28.0, 21.0, 16.0 and 12.0 percent effluent and a control. The critical dilution was defined as 28.0 percent effluent. The tests were conducted using five replicates of eight 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 September 24 and 25, 2013. Upon completion of collection, the samples were chilled to approximately 6.0° Celsius and delivered to Bio-Analytical Laboratories by BAL personnel. Sample temperature upon arrival was 0.9° Celsius for the first sample and 0.1° Celsius for the second sample.

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° Celsius. The total residual chlorine levels were measured with a Capital Controls^R amperometric titrator and recorded if present. The total ammonia levels were measured using a HACH^R test strip. Dissolved oxygen, pH and conductivity measurements were taken on the control and each test concentration at test initiation, at each renewal and at test termination. Alkalinity and hardness levels were measured on the control and the highest effluent concentration.

2.7 Monitoring of the Tests

The tests were run in a Precision^R dual controlled illuminated incubator at a temperature of 25±1° 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

The NOEC and LC₅₀ values were obtained by approved EPA methods of analysis, using the ToxCalc statistical program.

BAL
ADEQ #88-0630
Project X5223

3.0 Results and Discussion

The results of the tests can be found in Table 1. Significant differences in survival were not noted in either test. The NOEC value for both tests was 37.0 percent effluent (p=.05). The 48-hour LC₅₀ value for both tests was >37.0 percent effluent (p=.05).

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

Percent Effluent	Percent Survival	
	<i>Daphnia pulex</i>	Fathead minnow
Test Organism		
Control	90.0	100.0
12.0	90.0	97.5
16.0	85.0	100.0
21.0	92.5	100.0
28.0	95.0	100.0
37.0	92.5	100.0

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

BAL
ADEQ #88-0630
Project X5223

4.0 Conclusions

The two composite samples of Outfall 002 collected from Camden Water Utilities, Camden, Arkansas, on September 24 and 25, 2013, were not found to be lethally toxic to the fathead minnow test organisms nor the *Daphnia pulex* test organisms in the 28.0 percent critical dilution after 48 hours of exposure ($p=.05$).

BAL
ADEQ #88-0630
Project X5223

5.0 References

- EPA, 2002. Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms, Fifth Edition. EPA-821-R-02-012, Office of Water.
- EPA, 2000. Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination System. EPA-833-R-00-003, Office of Wastewater Management.
- EPA, 2000. Method Guidance and Recommendations for Whole Effluent (WET) Testing. EPA-821-B-00-04, Office of Water
- APHA, 1998. Standard Methods for The Examination of Water and Wastewater. 20th Edition.

APPENDIX A
CHAIN-OF-CUSTODY DOCUMENTS



Bio-Analytical Laboratories

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

Laboratory Use Only:

Company: Camden Water Utilities		Phone: (870) 836-4329		Analysis:						Project Number: <i>810013</i>		
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	Temp. upon arrival: <i>0.9°C</i>	
Permit #: AR0022365/ AFIN 52-00073		Purchase Order:									Thermometer #: <i>29</i>	
Sampler's Signature/Printed Name/Affiliation: <i>Mike Langley, Mike Langley Camden Water</i>											Tech: <i>zc</i>	
Date Start Date End	Time Start Time End	C	G	# and type of container	Sample Identification						Lab Control Number:	Preservative: (below)
<i>9-23-13</i> <i>9-24-13</i>	<i>8:14</i> <i>6:14</i>			<i>2 half gallons</i>	<i>002</i>			<i>X</i>	<i>X</i>		<i>C7999</i>	<i>ice</i>
Relinquished by/Affiliation: <i>Mike Langley</i>				Date: <i>9-25-13</i>	Time: <i>10:35</i>	Received by/Affiliation: <i>BAL</i> <i>Carl J. Bragg</i>				Date: <i>9/25/13</i>	Time: <i>1035</i>	
Relinquished by/Affiliation: <i>Carl J. Bragg</i>				Date: <i>9/25/13</i>	Time: <i>1300</i>	Received by/Affiliation: <i>L. Coyle</i>				Date: <i>9/25/13</i>	Time: <i>1300</i>	
Relinquished by/Affiliation:				Date:	Time:	Received by/Affiliation:				Date:	Time:	
Method of Shipment: <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Bus <input type="checkbox"/> Fed Ex <input type="checkbox"/> DHL <input type="checkbox"/> UPS <input type="checkbox"/> Client <input type="checkbox"/> Other Tracking # _____												
Comments:												
COC Rev. 3.0												



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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: <i>PA945/13</i> X5222 X5223 Temp. upon arrival: Temperature upon arrival: <i>0.1°C</i> Thermometer #: <i>29</i> Tech: <i>LL</i> Date: <i>9/25/13</i> Lab Control Number: 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>Mike Langley Mike Langley Camden Water</i>												
Date Start Date End	Time Start Time End	C	G					# and type of container				Sample Identification
<i>9-24-13</i> <i>9-25-13</i>	<i>8/A</i> <i>6/A</i>			<i>X</i>	<i>2 half gallons</i>	<i>002</i>					<i>08000</i>	<i>ice</i>
Relinquished by/Affiliation: <i>Mike Langley</i>				Date: <i>9-25-13</i>	Time: <i>10:35</i>	Received by/Affiliation: <i>BAL</i> <i>Cris S. Brupp</i>		Date: <i>9/25/13</i>	Time: <i>1035</i>			
Relinquished by/Affiliation: <i>Cris S. Brupp</i> <i>BAL</i>				Date: <i>9/25/13</i>	Time: <i>1300</i>	Received by/Affiliation: <i>L. W. [unclear]</i>		Date: <i>9/25/13</i>	Time: <i>1300</i>			
Relinquished by/Affiliation:				Date:	Time:	Received by/Affiliation:		Date:	Time:			
Method of Shipment: <input checked="" type="checkbox"/> Lab <input type="checkbox"/> Bus <input type="checkbox"/> Fed Ex <input type="checkbox"/> DHL <input type="checkbox"/> UPS <input type="checkbox"/> Client <input type="checkbox"/> Other Tracking # _____												
Comments:												
COC Rev. 3.0												

**APPENDIX B
RAW DATA SHEETS**

BIO-ANALYTICAL LABORATORIES
ACUTE TOXICITY TEST WATER QUALITY DATA

Project# X5223

Client: CMDN/Camden Water Utilities

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

NPDES# AR0022365 Outfall 002

Technicians: EGB/AH/LC/GW

Test initiated: Date 9/25/13 Time 1440

Test terminated: Date 9/27/13 Time 1507

Dissolved Oxygen Meter: Model # YSI 55D Serial #06E2089 AU

pH Meter: Model #Orion 230A+ Serial #015253

Conductivity Meter: Model # Control Co. Serial #80277924

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
							37%	37%	
C7999	9.4/107.1%	1/20 8.3/96.5%	40.01	NO	0.5	N/A	600	36.0	AH
C8000	8.9/113.6%	1/20 7.6/92.6%	40.01	↓	1.0	↓	520	32.0	GW

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
		NA	NA	NA	NA				
Soft H2O	3540					7.4	480	360	EGB

Test Species Information

Test Species Info.	Species: <u>Daphnia</u> ID#: <u>PAU K11-N11</u>	Species: <u>Pimephales</u> ID#: <u>PAU 9211A</u>	Species: ID#:	Species: ID#:
Age	424h	4 days		
Test Container Size	30ml	250ml		
Test volume	25ml	200ml		
Feeding: Type	YCT: Algae Artemia			
Amount	Fed 2 hrs prior to test initiation			
Aeration?	NA	NA		
Amount				
Condition of survivors				

Comments: Good 9/27/13 GW

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Project# X5223

Test started: Date 9/25/13

Time 1445

Client Camden

Test ended: Date 9/26/13

Time 1507

Sample Description 002

Test Species D. pulex

ID# BAL/K11-N11

Technician: 0hour AM 24hour AM 48hour AM 72hour AM 96hour AM

Time: 0hour 1445 24hour 1315 48hour 1507 72hour AM 96hour AM

Temperature (°C): 0hour 24.8 24hour 21.1 48hour 24.4 72hour AM 96hour AM

Test Dilution %	Replicate	Test Salinity	# Live Organisms					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	A	NA	8	8	8			8.2	8.4	8.1			7.4	7.4	7.5	7.5			189	8	222	233	235
	B		8	8	8																		
	C		8	8	6																		
	D		8	8	7																		
	E		8	8	7																		
12	A		8	8	8			8.2	8.3	8.1			7.4	7.4	7.4	7.4			216	8	247	242	251
	B		8	8	7																		
	C		8	8	8																		
	D		8	7	6																		
	E		8	7	7																		
Chemistry Tech prerenewal/postrenewal																							

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Project# X5223

Test started: Date 9/25/13

Time 1445

Client Camden

Test ended: Date 9/27/13

Time 1507

Sample Description 002

Test Species O. pulex

ID# BAUK11-N11

Technician: Ohour AM 24hour AM 48hour AM 72hour AM 96hour AM

Time: Ohour 1445 24hour 1345 48hour 1507 72hour AM 96hour AM

Temperature (°C): Ohour 21.8 24hour 24.1 48hour 24.4 72hour AM 96hour AM

Test Dilution %	Replicate	Test Salinity	# Live Organisms					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
110	A	NA	8	7	7			8.2	8.3	8.0			7.4	7.4	7.4			223	225	225		
	B		8	8	6																	
	C		8	7	7																	
	D		8	7	7																	
	E		8	8	7																	
21	A		8	8	8			8.2	8.2	8.0			7.5	7.4	7.4			232	235	233	267	
	B		8	7	7																	
	C		8	8	7																	
	D		8	8	8																	
	E		8	7	7																	
Chemistry Tech prerenewal/postrenewal								JC	AM	AM			JC	AM	AM			JC	AM	AM		

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Project# X5223

Test started: Date 9/25/13

Time 1445

Client Camden

Test ended: Date 9/27/13

Time 1507

Sample Description 002

Test Species O. pulex

ID# BR/K11-N11

Technician: Ohour PH 24hour PH 48hour PH 72hour PH 96hour PH
 Time: Ohour 1445 24hour 1507 48hour 1507 72hour PH 96hour PH
 Temperature (°C): Ohour 24.8 24hour 24.1 48hour 24.9 72hour PH 96hour PH

Test Dilution %	Replicate	Test Salinity	# Live Organisms					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
28	A	NA	8	8	8			8.2	8.2	7.9			7.4	7.4	7.4			246	245	250		
	B		8	8	8																	
	C		8	8	8																	
	D		8	7	7																	
	E		8	8	7																	
37	A		8	8	8			8.2	8.2	8.0			7.4	7.4	7.4			268	268	268		
	B		8	8	8																	
	C		8	8	7																	
	D		8	7	7																	
	E		8	7	7																	
Chemistry Tech prereneal/postrenewal																						

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Project# X5223

Test started: Date 9/25/13 Time 1440

Client Camden

Test ended: Date 9/27/13 Time 1453

Sample Description 002

Test Species P. promelas ID# BA192113

Technician: Ohour JC 24hour SW 48hour SW 72hour SW 96hour SW

Time: Ohour 1440 24hour 1338 48hour 1453 72hour SW 96hour SW

Temperature (°C): Ohour 24.8 24hour 22.0 48hour 24.4 72hour SW 96hour SW

Test Dilution %	Replicate	Test Salinity	# Live Organisms					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	A	NA	8	8	8			8.2	8.4	8.1			7.4	7.5	7.3			189.8	183	195		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
12	A		8	8	8			8.2	8.3	8.1			7.4	7.4	7.2			210	212	219		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	7	7																	
Chemistry Tech prerenewal/postrenewal							JC SW SW					JC SW SW					JC SW SW					

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Project# X5223

Test started: Date 9/25/13 Time 1440

Client Camden

Test ended: Date 9/27/13 Time 1453

Sample Description 002

Test Species P. promelas ID# BA/9a113

Technician: 0hour JC 24hour SW 48hour SW 72hour SW 96hour SW
 Time: 0hour 1440 24hour 1338 48hour 1453 72hour SW 96hour SW
 Temperature (°C): 0hour 24.8 24hour 24.0 48hour 24.7 72hour SW 96hour SW

Test Dilution %	Replicate	Test Salinity	# Live Organisms					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
16	A	NA	8	8	8			8.2	7.8	7.9			7.4	7.4	7.2			223	231	227		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
21	A		8	8	8			8.2	7.8	7.9			7.5	7.1	7.3			232	240	233	240	
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal							JC	SW	SW			JC	SW	SW			JC	SW	SW			

BIO-ANALYTICAL LABORATORIES ACUTE TOXICITY TEST SURVIVAL AND WATER QUALITY DATA

Project# X5223

Test started: Date 9/25/13 Time 14:00

Client Camden

Test ended: Date 9/26/13 Time 14:13

Sample Description 002

Test Species P. promelas ID# BRU/93113

Technician: Ohour JC 24hour JW 48hour JW 72hour JW 96hour JW

Time: Ohour 14:40 24hour 13:38 48hour 13:45 72hour JW 96hour JW

Temperature (°C): Ohour 24.8 24hour 24.0 48hour 27.4 72hour JW 96hour JW

Test Dilution %	Replicate	Test Salinity	# Live Organisms					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
28	A	110	8	8	8			8.2	7.7	7.9			7.4	7.2	7.3			246	255	259		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
37	A	110	8	8	8			8.2	7.7	7.9			7.4	7.2	7.2			268	279	284		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal			JC JW JW JW JW					JC JW JW JW JW					JC JW JW JW JW									

APPENDIX C
STATISTICAL ANALYSIS

Daphnid Acute Test-48 Hr Survival

Start Date: 9/25/2013 Test ID: X5223DP Sample ID: 2
 End Date: 9/27/2013 Lab ID: ADEQ880630 Sample Type: EFF1-POTW
 Sample Date: 9/25/2013 Protocol: EPAAW02-EPA/821/R-02-01 Test Species: CD-Ceriodaphnia dubia
 Comments:

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

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root				N	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	0.9000	1.0000	1.2504	1.0472	1.3931	11.683	5	27.50	16.00
16	0.8500	0.9444	1.1770	1.0472	1.2094	6.164	5	23.50	16.00
21	0.9250	1.0278	1.2829	1.2094	1.3931	7.841	5	29.00	16.00
28	0.9500	1.0556	1.3196	1.2094	1.3931	7.623	5	31.00	16.00
37	0.9250	1.0278	1.2829	1.2094	1.3931	7.841	5	29.00	16.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.92291	0.927	-0.1982	-0.9681
Bartlett's Test indicates equal variances (p = 0.78)	2.50681	15.0863		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	37	>37		2.7027
Treatments vs D-Control				

Acute Fish Test-48 Hr Survival

Start Date: 9/25/2013 Test ID: X5223PP Sample ID: 2
 End Date: 9/27/2013 Lab ID: ADEQ880630 Sample Type: EFF1-POTW
 Sample Date: 9/25/2013 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	1.0000	1.0000	1.0000	1.0000	0.8750
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	1.0000	1.0000	1.0000	1.0000

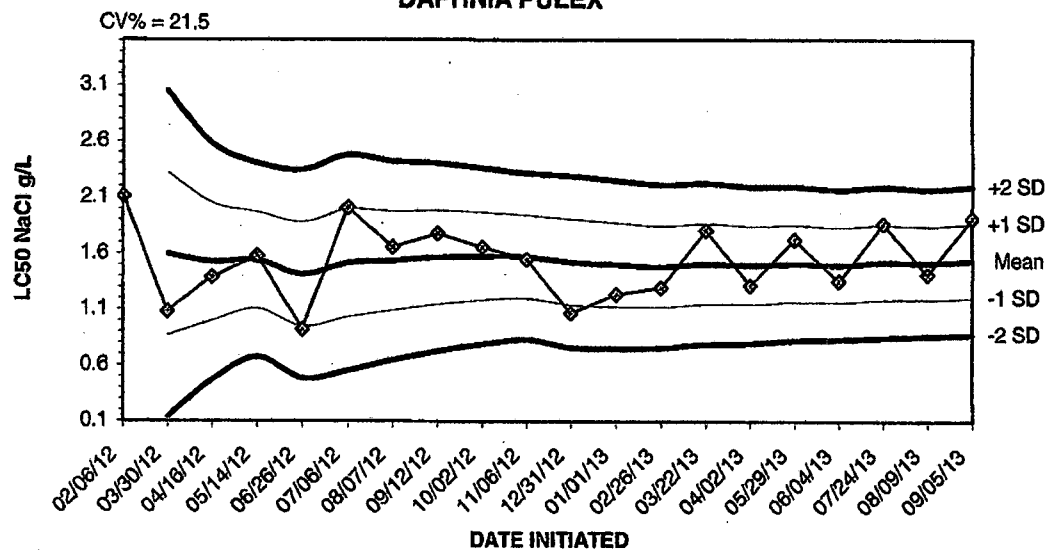
Conc-%	Mean	N-Mean	Transform: Arcsin Square Root				N	Rank Sum	1-Tailed Critical
			Mean	Min	Max	CV%			
D-Control	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5		
12	0.9750	0.9750	1.3564	1.2094	1.3931	6.055	5	25.00	16.00
16	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5	27.50	16.00
21	1.0000	1.0000	1.3931	1.3931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

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.41613	0.927	-3.8705	19.8512
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				

EAB
10/2/13

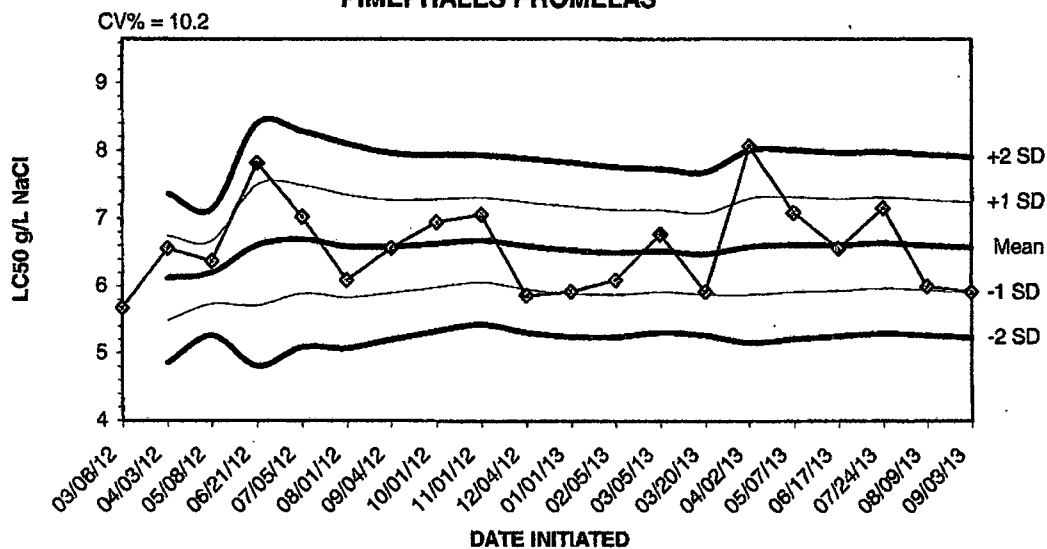
APPENDIX D
QUALITY ASSURANCE CHARTS

**2013 48-HOUR ACUTE REFERENCE TOXICANT TEST RESULTS USING
DAPHNIA PULEX**



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
02/06/12	2.1100					
03/30/12	1.0800	1.5950	0.8667	0.1384	2.3233	3.0516
04/16/12	1.3900	1.5267	0.9982	0.4698	2.0551	2.5835
05/14/12	1.5800	1.5400	1.1077	0.6754	1.9723	2.4046
06/26/12	0.9200	1.4160	0.9501	0.4843	1.8819	2.3477
07/06/12	2.0100	1.5150	1.0329	0.5508	1.9971	2.4792
08/07/12	1.6600	1.5357	1.0922	0.6487	1.9792	2.4227
09/12/12	1.7800	1.5663	1.1467	0.7271	1.9858	2.4054
10/02/12	1.6600	1.5767	1.1829	0.7892	1.9704	2.3641
11/06/12	1.5500	1.5740	1.2027	0.8314	1.9453	2.3166
12/31/12	1.0700	1.5282	1.1445	0.7609	1.9118	2.2955
01/01/13	1.2400	1.5042	1.1290	0.7539	1.8793	2.2544
02/26/13	1.3000	1.4885	1.1249	0.7613	1.8521	2.2156
03/22/13	1.8100	1.5114	1.1517	0.7919	1.8712	2.2309
04/02/13	1.3200	1.4987	1.1485	0.7983	1.8488	2.1990
05/29/13	1.7300	1.5131	1.1699	0.8267	1.8563	2.1995
06/04/13	1.3600	1.5041	1.1698	0.8354	1.8385	2.1728
07/24/13	1.8700	1.5244	1.1888	0.8531	1.8601	2.1957
08/09/13	1.4200	1.5189	1.1919	0.8648	1.8460	2.1731
09/05/13	1.9200	1.5390	1.2083	0.8775	1.8697	2.2005

**2013 48-HOUR REFERENCE TOXICANT TEST RESULTS FOR
PIMEPHALES PROMELAS**



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
03/06/12	5.6700					
04/03/12	6.5600	6.1150	5.4857	4.8563	6.7443	7.3737
05/08/12	6.3700	6.2000	5.7313	5.2626	6.6687	7.1374
06/21/12	7.8200	6.6050	5.7091	4.8133	7.5009	8.3967
07/05/12	7.0300	6.6900	5.8912	5.0924	7.4888	8.2876
08/01/12	6.0900	6.5900	5.8347	5.0795	7.3453	8.1005
09/04/12	6.5700	6.5871	5.8976	5.2081	7.2767	7.9662
10/01/12	6.9500	6.6325	5.9814	5.3302	7.2836	7.9348
11/01/12	7.0600	6.6800	6.0545	5.4290	7.3055	7.9310
12/04/12	5.8600	6.5980	5.9538	5.3095	7.2422	7.8865
01/01/13	5.9200	6.5364	5.8919	5.2474	7.1808	7.8253
02/05/13	6.0900	6.4992	5.8713	5.2435	7.1270	7.7548
03/05/13	6.7700	6.5200	5.9142	5.3084	7.1258	7.7316
03/20/13	5.9200	6.4771	5.8734	5.2697	7.0808	7.6845
04/02/13	8.0700	6.5833	5.8709	5.1585	7.2958	8.0082
05/07/13	7.0900	6.6150	5.9152	5.2153	7.3148	8.0147
06/17/13	6.5600	6.6118	5.9340	5.2563	7.2895	7.9673
07/24/13	7.1600	6.6422	5.9721	5.3020	7.3123	7.9824
08/09/13	6.0000	6.6084	5.9408	5.2731	7.2761	7.9438
09/03/13	5.9200	6.5740	5.9062	5.2383	7.2418	7.9097

APPENDIX E
AGENCY FORMS

Acute Forms
Daphnia pulex Survival

Permittee: Camden Water Utilities

NPDES Permit Number: AR0022365/ AFIN 52-00073

Composite Collected

From: 9/23/13

To: 9/24/13

From: 9/24/13

To: 9/25/13

Test Initiated: 9/25/13

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	87.5	100.0	100.0	100.0
	B	100.0	100.0	100.0	87.5	100.0	100.0
	C	100.0	100.0	87.5	100.0	100.0	100.0
	D	100.0	87.5	87.5	100.0	87.5	87.5
	E	100.0	87.5	100.0	87.5	100.0	87.5
48-hour	A	100.0	100.0	87.5	100.0	100.0	100.0
	B	100.0	87.5	75.0	87.5	100.0	100.0
	C	75.0	100.0	87.5	87.5	100.0	87.5
	D	87.5	75.0	87.5	100.0	87.5	87.5
	E	87.5	87.5	87.5	87.5	87.5	87.5
	Mean	90.0	90.0	85.0	92.5	95.0	92.5

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 LC_{50} below:

LC_{50} = >28.0% effluent

95 % confidence limits: N/A

Method of LC_{50} calculation: N/A

3. If you answered NO to 1.a) enter (P) otherwise enter (F): P

4. Enter response to item 3 on DMR Form, parameter TEM3D

5. If you answered NO to 1.b) enter (P) otherwise enter (F): N/A

6. Enter response to item 5 on DMR Form, parameter TFM3D

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

**Permittee: Camden Water Utilities
NPDES Number: AR0022365/ AFIN 52-00073**

**Contact: David Richardson
Analyst: Haughton, Williams**

**Sample Collected From: Date 9/23/13 Time 0800
To: Date 9/24/13 Time 0600
Test Begin Date 9/25/13 Time 1445
Test End Date 9/27/13 Time 1507**

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		8.2	8.4	8.1	24.8	24.1	24.4	36.0			48.0			7.4	7.5	7.5
12		8.2	8.3	8.1	24.8	24.1	24.4							7.4	7.4	7.4
16		8.2	8.3	8.0	24.8	24.1	24.4							7.4	7.4	7.4
21		8.2	8.2	8.0	24.8	24.1	24.4							7.5	7.4	7.4
28		8.2	8.2	7.9	24.8	24.1	24.4							7.4	7.4	7.4
37		8.2	8.2	8.0	24.8	24.1	24.4	60.0	36.0		52.0	32.0		7.4	7.5	7.4

*This Form is to be submitted with each DMR.
Alkalinity and hardness to be reported as mg/l CaCO₃

Acute Forms
Pimephales promelas (Fathead minnow) Survival

Permittee: Camden Water Utilities

NPDES Permit Number: AR0022365/ AFIN 52-00073

Composite Collected

From: 9/23/13

To: 9/24/13

From: 9/24/13

To: 9/25/13

Test Initiated: 9/25/13

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	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	87.5	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	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	87.5	100.0	100.0	100.0	100.0
	Mean	100.0	97.5	100.0	100.0	100.0	100.0

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 = >28.0% 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
Fathead minnow 48 hour Acute Static Renewal
Chemical Parameters Chart***

**Permittee: Camden Water Utilities
NPDES Number: AR0022365/ AFIN 52-00073**

Contact: David Richardson

Analyst: Cotty, Williams

Sample Collected From: Date 9/23/13 Time 0800

To: Date 9/24/13 Time 0600

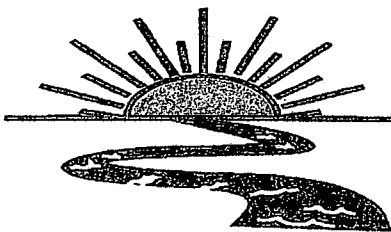
Test Begin Date 9/25/13 Time 1440

Test End Date 9/27/13 Time 1453

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		8.2	8.4	7.9	24.8	24.0	24.4	36.0			48.0			7.4	7.5	7.3
12		8.2	8.3	7.9	24.8	24.0	24.4							7.4	7.4	7.2
16		8.2	8.3	7.8	24.8	24.0	24.4							7.4	7.4	7.2
21		8.2	8.2	7.9	24.8	24.0	24.4							7.5	7.4	7.3
28		8.2	8.2	7.9	24.8	24.0	24.4							7.4	7.4	7.3
37		8.2	8.2	7.9	24.8	24.0	24.4	60.0	36.0		52.0	32.0		7.4	7.5	7.2

*This Form is to be submitted with each DMR.
Alkalinity and hardness to be reported as mg/l CaCO₃

APPENDIX F
REPORT QUALITY ASSURANCE FORM



Bio-Analytical Laboratories

3240 Spurgin Road
Post Office Box 527
Doyline, LA 71023

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

REPORT QUALITY ASSURANCE FORM

Client: Camden Water

Project#: X5223

Chain of Custody Documents Checked by: AH 10/1/13
Technician/Date

Raw Data Documents Checked by: AH 10/1/13
Technician/Date

Statistical Analysis Package Checked by: EGB 10/2/13
Quality Manager/Date

Quality Control Data Checked by: EGB 9/10/13
Quality Manager/Date

Report Checked by: EGB 10/3/13
Quality Manager/Date

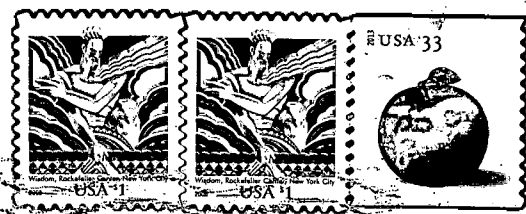
I certify that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. The information contained in this document, to the best of my knowledge, is true, accurate and complete.

Kevin H. Buggins
Quality Manager

10/3/13
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
P.O. Box J
Camden, AR 71711



CENTRAL AR BRNC 722
WED 16 OCT 2017

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NPDES Enforcement Division
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