

Bio-Analytical Laboratories (BAL)  
ADEQ#88-0630  
Project X5797

### Bio-Analytical Laboratories' Executive Summary

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

**Project #:** X5797

**Outfall:** Outfall 002 (treated municipal wastewater)

**Permit #:** AR0022365/ AFIN 52-00073

**Contact:** David Richardson

**Test Dates:** July 15 - 17, 2015

**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 - 0.00%

##### 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.



## **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**

**EPA Methods 2000.0 and 2021.0**

**Project X5797**

**Test Dates: July 15 - 17, 2015  
Report Date: July 30, 2015**

**Prepared for:**  
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Camden Water Utilities  
P.O. Drawer J  
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ADEQ #88-0630

BAL  
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Project X5797

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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 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<sub>50</sub>, 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), "Standard Methods for The Examination of Water and Wastewater, 20<sup>th</sup> Edition" (APHA 1998. Chemical results using this edition are listed in the report as SM 1997), and BAL's standard operating procedure.

### 2.2 Test Organisms

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

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### **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 July 14 and 15, 2015 at 0800 hours. Upon completion of collection, the samples were chilled then packed in ice and delivered to Bio-Analytical Laboratories by BAL personnel. Sample temperature upon arrival was 1.3<sup>0</sup> Celsius.

### **2.6 Sample Preparation**

Upon arrival, the samples were logged in, given an identification number and refrigerated unless needed. Prior to use, each sample was warmed to 25±1<sup>0</sup> Celsius. The total residual chlorine level was measured in milligrams/Liter (mg/L) with a Capital Controls<sup>R</sup> amperometric titrator (SM 4500-C1 D 1997) and recorded if present. The total ammonia level was measured in mg/L using a HACH<sup>R</sup> test strip. Dissolved oxygen (SM 4500-0 G 1997) and pH (SM 4500-H+ B 1997) measurements were measured in mg/L and standard units respectively, on the control and each concentration at test initiation, at test renewal and at test termination. Conductivity (SM 2510 B 1997) measurements in umhos/cm were also taken at test initiation and at each renewal. Alkalinity (SM 2320 B 1997) and hardness (SM 2340 C 1997) levels were measured in mg/L as CaCO<sub>3</sub> on the control and the highest effluent concentration.

### **2.7 Monitoring of the Tests**

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

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## 2.8 Data Analysis

The NOEC and LC<sub>50</sub> values values were obtained by approved EPA methods of analysis, using the ToxCalc statistical program.

## 3.0 Results and Discussion

The results of the 48-hour tests can be found in Table 1. One hundred percent survival occurred in all of the test concentrations in both tests. The NOEC for survival in both tests was 37.0 percent (p=.05). The 48-hour LC<sub>50</sub> 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	100.0	100.0
12.0	100.0	100.0
16.0	100.0	100.0
21.0	100.0	100.0
28.0	100.0	100.0
37.0	100.0	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.

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#### 4.0 Conclusions

The two 24-hour composite samples of Outfall 002, collected from the wastewater treatment plant serving the city of Camden, Arkansas, on July 14 and 15, 2015, were not found to be lethally toxic to the *Daphnia pulex* test organisms nor the fathead minnow test organism in the 28.0 percent critical dilution after 48 hours of exposure ( $p=.05$ ). The 48-hour  $LC_{50}$  value for both tests was  $>37.0$  percent effluent ( $p=.05$ ).

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### 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. 20<sup>th</sup> Edition.



**APPENDIX A**  
**CHAIN-OF-CUSTODY DOCUMENTS**



**Bio-Analytical Laboratories**

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

Day 1

Laboratory Use Only:

Company: Camden Water Utilities		Phone: (870) 836-4329		Analysis:				Project Number:  X5797				
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	Temperature upon arrival: 1.3°C Thermometer #: 29 Tech: RC Date: 7/15/15
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				
7-13 7-14	8:00 A 8:00 A	X		2 half gallons	002		C11224	Ice				
Relinquished by/Affiliation: <i>Annette Strickland</i>				Date: 7-15-15	Time: 1015	Received by/Affiliation: <i>J B...</i>		Date: 7-15-15	Time: 1015			
Relinquished by/Affiliation:				Date:	Time:	Received by/Affiliation:		Date:	Time:			
Relinquished by/Affiliation: <i>J B...</i>				Date: 7-15-15	Time: 1300	Received by/Affiliation: <i>R Callahan</i>		Date: 7/15/15	Time: 1300			
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

Day 2

Laboratory Use Only:

<b>Company:</b> Camden Water Utilities		<b>Phone:</b> (870) 836-4329		<b>Analysis:</b>				<b>Project Number:</b> X5797						
<b>Address:</b> P.O. Box J, Camden, AR 71711		<b>Fax:</b> (870) 836-5190		Chronic Ceriodaphnia	Chronic minnow	Acute minnow (fresh/marine)	Acute Daphnia species		Acute Mysid	Acute Ceriodaphnia	Fecal Coliform			
<b>Permit #:</b> AR0022365/ AFIN 52-00073		<b>Purchase Order:</b>										Temperature upon arrival: 13°	<b>Temp. upon</b> <b>Thermometer #:</b> 29	
<b>Sampler's Signature/Printed Name/Affiliation:</b> <i>Annette Strickland</i>														<b>Tech:</b> PC
<b>Date Start</b> Date End	<b>Time Start</b> Time End	<b>C</b>	<b>G</b>					<b># and type of container</b>						
7-14 7-15	8:00A 8:00A	X		2 half gallons	002		X	X			C11225	Ice		
<b>Relinquished by/Affiliation:</b> <i>Annette Strickland</i>				<b>Date:</b> 7-15-15	<b>Time:</b> 1015	<b>Received by/Affiliation:</b> <i>LRB</i>		<b>Date:</b> 7-15-15	<b>Time:</b> 1015					
<b>Relinquished by/Affiliation:</b>				<b>Date:</b>	<b>Time:</b>	<b>Received by/Affiliation:</b>		<b>Date:</b>	<b>Time:</b>					
<b>Relinquished by/Affiliation:</b> <i>LRB</i>				<b>Date:</b> 7-15-15	<b>Time:</b> 1300	<b>Received by/Affiliation:</b> <i>R Callahan</i>		<b>Date:</b> 7/15/15	<b>Time:</b> 1300					
<b>Method of Shipment:</b> <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 <b>Tracking #</b> _____														
<b>Comments:</b>														
COC Rev. 3.0														

**APPENDIX B**  
**RAW DATA SHEETS**

BIO-ANALYTICAL LABORATORIES  
ACUTE TOXICITY TEST WATER QUALITY DATA

Project# X5797

Client: CMDN/Camden Water Utilities

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

NPDES#AR0022365 Outfall 002

Technicians: EGB/RC/CR/BJ

Test initiated: Date 7-15-15 Time 1430

Test terminated: Date 7-17-15 Time 1525

Dissolved Oxygen Meter: Model # YSI 550A Serial #06E2089 AV

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

Conductivity Meter: Model # Control Co. Serial #122175539

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%	
C11224	8.2/97.4%	NO	<0.01	NO	6.0	N/A	44.0	32.0	CR
C11225	6.7/93%	20/8.1 96.6%	<0.01	↓	6.0	↓	40.0	36.0	RC

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
		N/A							
Soft Recon	3751		NA	N/A	N/A	7.0	44.0	28.0	CR

Test Species Information

Test Species Info.	D. pulex Species: ID#: BAL/010-S1	P. promelas Species: ID#: BAL/010715	Species: ID#:	Species: ID#:
Age	<24 hrs	≈ 8d		
Test Container Size	30 ml	300 ml		
Test volume	25 ml	250 ml		
Feeding: Type	2 hrs prior to test initiation			
Amount				
Aeration?	N/A	N/A		
Amount				
Condition of survivors	good ✓ good			

Comments:

EGB 7/17/15

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

Project# X5797

Test started: Date 7/15/15

Time 1530

Client Camden

Test ended: Date 7/17/15

Time 1525

Sample Description 002

Test Species D. pulex

ID# BAL010-81

Technician: Ohour CR 24hour RC 48hour EGB 72hour \_\_\_\_\_ 96hour \_\_\_\_\_  
 Time: Ohour 1530 24hour 1555 48hour 1525 72hour \_\_\_\_\_ 96hour \_\_\_\_\_  
 Temperature (°C): Ohour 25.1 24hour 25.0 48hour 25.1 72hour \_\_\_\_\_ 96hour \_\_\_\_\_

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
70		N/A																				
soft																						
0	A	S	8	8	8			7.9	7.8	7.8			7.4	7.4	7.5			170.3	167.7	188.9		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
12	A	S	8	8	8			7.9	7.9	7.7			7.2	7.5	7.5			177.3	180.1	199		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal								CR	RC	EGB			CR	RC	EGB			CR	RC	EGB		

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

Project# X5797

Test started: Date 7/15/15 Time 1530

Client Camden

Test ended: Date 7/17/15 Time 1525

Sample Description 002

Test Species D. pulex ID# BAL90-S1

Technician: 0hour CR 24hour RC 48hour RCB 72hour \_\_\_\_\_ 96hour \_\_\_\_\_

Time: 11:50 0hour 25.1530 24hour 1555 48hour 1525 72hour \_\_\_\_\_ 96hour \_\_\_\_\_

Temperature (°C): 0hour 25.1 24hour 25.0 48hour 25.1 72hour \_\_\_\_\_ 96hour \_\_\_\_\_

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
90		N/A																				
16	A	}	8	8	8			7.9	<del>7.7</del>	7.7			7.1	<del>7.4</del>	7.5			181.4	<del>183.7</del>	203		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
21	A	}	8	8	8			7.9	<del>7.7</del>	7.9			7.1	<del>7.4</del>	7.5			183.8	<del>190.3</del>	208		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal			CR <del>RC</del> <del>RCB</del>					CR <del>RC</del> <del>RCB</del>					CR <del>RC</del> <del>RCB</del>									

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

Project# X5797  
 Client Camden

Test started: Date 7/15/15 Time 1530  
 Test ended: Date 7/17/15 Time 1525

Sample Description 002 Test Species D. pulex ID# BA/010-81  
 Technician: Ohour CR 24hour RC 48hour EGP 72hour \_\_\_\_\_ 96hour \_\_\_\_\_  
 Time: Ohour 1530 24hour 1555 48hour 1525 72hour \_\_\_\_\_ 96hour \_\_\_\_\_  
 Temperature (°C): Ohour 25.1 24hour 25.0 48hour 25.1 72hour \_\_\_\_\_ 96hour \_\_\_\_\_

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
070		N/A																				
28	A	}	8	8	8			7.9	7.8	7.8			7.0	7.5	7.5			190.3	220	218		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
37	A	}	8	8	8			7.9	7.8	7.8			7.0	7.5	7.5			193.9	216	224		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal			CR	RC	RC	EGP		CR	RC	RC	EGP		CR	RC	RC	EGP						



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

Project# X5797

Test started: Date 7/15/15 Time 1430

Client Camden

Test ended: Date 7/17/15 Time 1415

Sample Description 002

Test Species P. promelas ID# BA2/07015

Technician: Ohour CR 24hour CR/CR 48hour ECB 72hour \_\_\_\_\_ 96hour \_\_\_\_\_

Time: Ohour 1430 24hour 1430 48hour 1415 72hour \_\_\_\_\_ 96hour \_\_\_\_\_

Temperature (°C): Ohour 25.0 24hour 25.0 48hour 25.1 72hour \_\_\_\_\_ 96hour \_\_\_\_\_

Test Dilution	Replicate	Test Salinity	# Live Organisms					ECB 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		N/A																				
0	A	}	8	8	8			7.9	7.7/8.0	7.8			7.4	7.2/7.4	7.4			176.3	172.2/167.1	166.2		
SOPE	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
12	A	}	8	8	8			7.9	7.7/8.0	7.8			7.2	7.2/7.5	7.3			177.3	157.4/180.1	184.7		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal			CR <u>CR</u> / RC <u>ECB</u>					CR <u>CR</u> / RC <u>ECB</u>					CR <u>CR</u> / RC <u>ECB</u>									

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

Project# X5797

Test started: Date 7/15/15 Time 1430

Client Camden

Test ended: Date 7/17/15 Time 1415

Sample Description 002

Test Species P. promelas ID# BAL/070715

Technician: 0hour CR 24hour DJ/EB 48hour EB 72hour \_\_\_\_\_ 96hour \_\_\_\_\_

Time: 0hour 1430 24hour 1430 48hour 1415 72hour \_\_\_\_\_ 96hour \_\_\_\_\_

Temperature (°C): 0hour 25.1 24hour 25.0 48hour 25.1 72hour \_\_\_\_\_ 96hour \_\_\_\_\_

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
9%		N/A																				
16	A	}	8	8	8			7.9	7.7/8.0	7.8			7.1	7.2/7.5	7.3			181.4	191.5/183.7	189.2		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
21	A	}	8	8	8			7.9	7.6/8.0	7.7			7.1	7.2/7.5	7.4			183.8	199/190.2	199.0		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry tech prerenewal/postrenewal			CR <u>DJ/RC</u> <u>EB</u>					CR <u>DJ/RC</u> <u>EB</u>					CR <u>DJ/RC</u> <u>EB</u>									

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

Project# X5797

Test started: Date 7/15/15 Time 1430

Client Camden

Test ended: Date 7/17/15 Time 1415

Sample Description 002

Test Species P. promelas ID# BAL1070715

Technician: Ohour CR 24hour BJ/ECB 48hour ECB 72hour \_\_\_\_\_ 96hour \_\_\_\_\_  
 Time: Ohour 1430 24hour 1430 48hour 1415 72hour \_\_\_\_\_ 96hour \_\_\_\_\_  
 Temperature (°C): Ohour 25.1 24hour 25.0 48hour 25.1 72hour \_\_\_\_\_ 96hour \_\_\_\_\_

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
96		N/A																				
28	A	}	8	8	8			7.9	7.6/8.0	7.7			7.0	7.2/7.5	7.4			190.3	206/199	20.5		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
37	A	}	8	8	8			7.9	7.4/8.0	7.7			7.0	7.3/7.5	7.4			193.9	223/209	21.9		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal			CR BJ/ECB					CR BJ/ECB					CR BJ/ECB									

**APPENDIX C**  
**STATISTICAL ANALYSIS**

**Daphnid Acute Test-48 Hr Survival**

Start Date: 7/15/2015      Test ID: X5797DP      Sample ID: AR0022365  
 End Date: 7/17/2015      Lab ID: ADEQ880630      Sample Type: EFF1-POTW  
 Sample Date: 7/14/2015      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	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	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-%	Transform: Arcsin Square Root							Rank Sum	1-Tailed Critical
	Mean	N-Mean	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	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 normal distribution (p > 0.05)	1	0.927		
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				

**Acute Fish Test-48 Hr Survival**

Start Date: 7/15/2015 Test ID: X5797PP Sample ID: AR0022365  
 End Date: 7/17/2015 Lab ID: ADEQ880630 Sample Type: EFF1-POTW  
 Sample Date: 7/14/2015 Protocol: EPAAW02-EPA/821/R-02-01 Test Species: PP-Pimephales promelas

Comments:

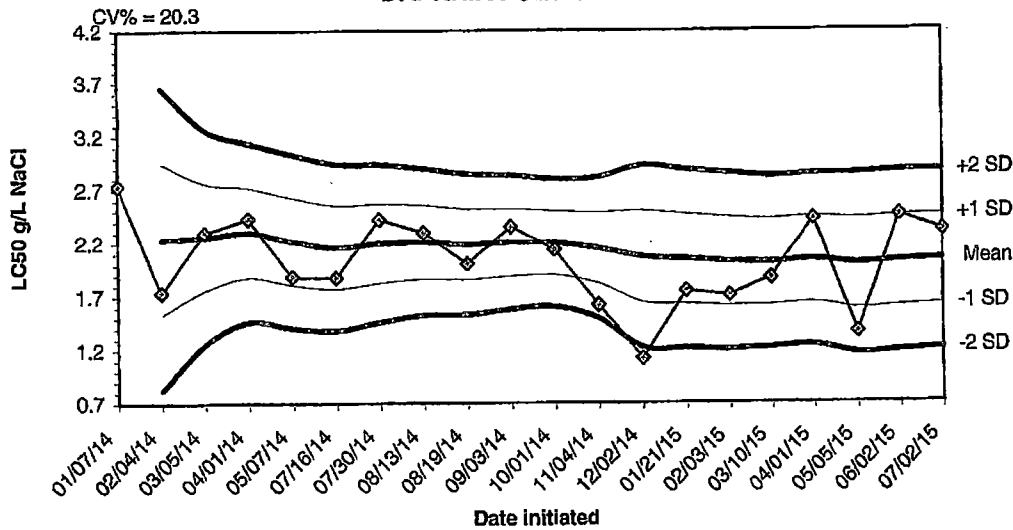
Conc-%	1	2	3	4	5
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000
12	1.0000	1.0000	1.0000	1.0000	1.0000
16	1.0000	1.0000	1.0000	1.0000	1.0000
21	1.0000	1.0000	1.0000	1.0000	1.0000
28	1.0000	1.0000	1.0000	1.0000	1.0000
37	1.0000	1.0000	1.0000	1.0000	1.0000

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	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	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 normal distribution ( $p > 0.05$ )	1	0.927		
Equality of variance cannot be confirmed				
<b>Hypothesis Test (1-tail, 0.05)</b>	<b>NOEC</b>	<b>LOEC</b>	<b>ChV</b>	<b>TU</b>
Steel's Many-One Rank Test	37	>37	2.7027	
Treatments vs D-Control				

**APPENDIX D**  
**QUALITY ASSURANCE CHARTS**

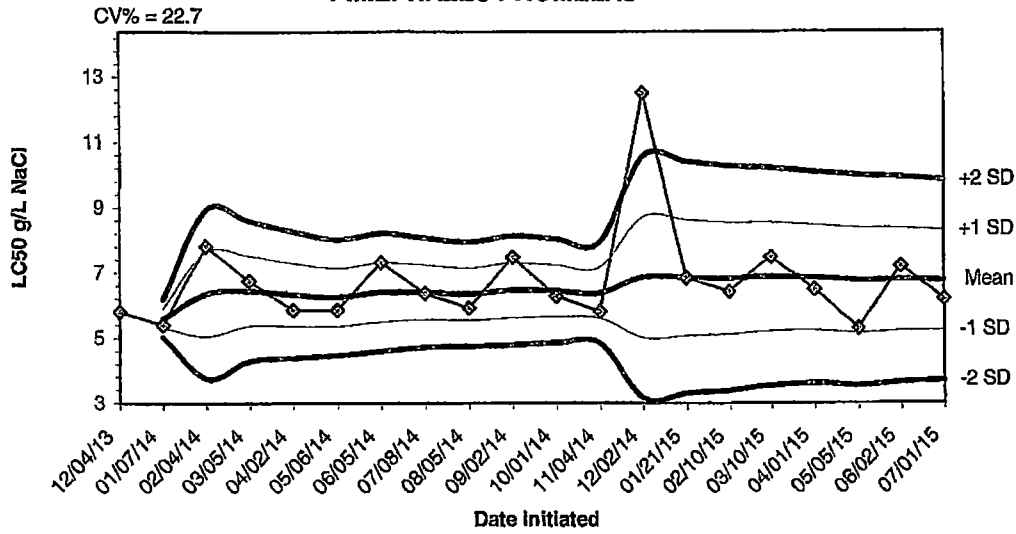
**2015 48-HOUR ACUTE REFERENCE TOXICANT TEST RESULTS USING  
DAPHNIA PULEX**



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
01/07/14	2.7400					
02/04/14	1.7400	2.2400	1.5329	0.8258	2.9471	3.6542
03/05/14	2.3000	2.2600	1.7588	1.2576	2.7612	3.2624
04/01/14	2.4300	2.3025	1.8845	1.4666	2.7205	3.1384
05/07/14	1.8900	2.2200	1.8137	1.4075	2.6263	3.0325
07/16/14	1.8800	2.1633	1.7744	1.3854	2.5523	2.9413
07/30/14	2.4200	2.2000	1.8319	1.4638	2.5681	2.9362
08/13/14	2.3000	2.2125	1.8699	1.5272	2.5551	2.8978
08/19/14	2.0100	2.1900	1.8625	1.5349	2.5175	2.8451
09/03/14	2.3500	2.2060	1.8931	1.5802	2.5189	2.8318
10/01/14	2.1400	2.2000	1.9025	1.6050	2.4975	2.7950
11/04/14	1.6200	2.1517	1.8223	1.4929	2.4811	2.8105
12/02/14	1.1200	2.0723	1.6465	1.2206	2.4981	2.9240
01/21/15	1.7500	2.0493	1.6312	1.2131	2.4674	2.8855
02/03/15	1.7100	2.0267	1.6144	1.2021	2.4390	2.8513
03/10/15	1.8700	2.0169	1.6166	1.2164	2.4171	2.8174
04/01/15	2.4200	2.0406	1.6409	1.2412	2.4403	2.8399
05/05/15	1.3600	2.0028	1.5832	1.1635	2.4224	2.8420
06/02/15	2.4500	2.0263	1.6058	1.1853	2.4468	2.8673
07/02/15	2.3100	2.0405	1.6263	1.2121	2.4547	2.8689



**2015 48-HOUR ACUTE REFERENCE TOXICANT TEST RESULTS USING  
PIMEPHALES PROMELAS**



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
12/04/13	5.8100					
01/07/14	5.4000	5.6050	5.3151	5.0252	5.8949	6.1848
02/04/14	7.8200	6.3433	5.0482	3.7530	7.6385	8.9336
03/05/14	6.7500	6.4450	5.3681	4.2913	7.5219	8.5987
04/02/14	5.8600	6.3280	5.3594	4.3908	7.2966	8.2652
05/06/14	5.8600	6.2500	5.3628	4.4757	7.1372	8.0243
06/05/14	7.3100	6.4014	5.4979	4.5944	7.3050	8.2085
07/08/14	6.3700	6.3975	5.5609	4.7243	7.2341	8.0707
08/05/14	5.9200	6.3444	5.5459	4.7473	7.1430	7.9416
09/02/14	7.4800	6.4580	5.6238	4.7897	7.2922	8.1263
10/01/14	6.2800	6.4418	5.6486	4.8555	7.2350	8.0282
11/04/14	5.8100	6.3892	5.6112	4.8333	7.1671	7.9450
12/02/14	12.5000	6.8592	5.0079	3.1567	8.7105	10.5618
01/21/15	6.8500	6.8586	5.0799	3.3013	8.6372	10.4159
02/10/15	6.4200	6.8293	5.1116	3.3940	8.5470	10.2647
03/10/15	7.4800	6.8700	5.2026	3.5352	8.5374	10.2048
04/01/15	6.4800	6.8471	5.2298	3.6126	8.4643	10.0815
05/05/15	5.2900	6.7606	5.1493	3.5380	8.3718	9.9831
06/02/15	7.2000	6.7837	5.2146	3.6454	8.3528	9.9220
07/01/15	6.1800	6.7535	5.2203	3.6870	8.2867	9.8200

**APPENDIX E**  
**AGENCY FORMS**

**Acute Forms**  
**Daphnia pulex Survival**

**Permittee: Camden Water Utilities**

**NPDES Permit Number: AR0022365/ AFIN 52-00073**

**Composite Collected**

**From: 7/13/15**

**To: 7/14/15**

**From: 7/14/15**

**To: 7/15/15**

**Test Initiated: 7/15/15**

**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	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	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	100.0	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 LC<sub>50</sub> below:**

LC<sub>50</sub> =      >37.0% effluent

95 % confidence limits: N/A

Method of LC<sub>50</sub> 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:** Briggs, Callahan, Rose

**Sample Collected**      **From:**      **Date 7/13/15**      **Time 0800**  
    **To:**      **Date 7/14/15**      **Time 0800**

**Test Begin**      **Date 7/15/15**      **Time 1530**  
**Test End**      **Date 7/17/15**      **Time 1525**

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		7.9	8.0	7.8	25.1	25.0	25.1	28.0			44.0			7.4	7.4	7.5
12.0		7.9	8.0	7.7	25.1	25.0	25.1							7.2	7.5	7.5
16.0		7.9	8.0	7.7	25.1	25.0	25.1							7.1	7.5	7.5
21.0		7.9	8.0	7.9	25.1	25.0	25.1							7.1	7.5	7.5
28.0		7.9	8.0	7.8	25.1	25.0	25.1							7.0	7.5	7.5
37.0		7.9	8.0	7.8	25.1	25.0	25.1	32.0	36.0		44.0	40.0		7.2	7.5	7.5

\*This Form is to be submitted with each DMR.  
 Alkalinity and hardness to be reported as mg/l CaCO<sub>3</sub>

**Acute Forms**  
**Pimephales promelas Survival**

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

Composite Collected      From: 7/13/15      To: 7/14/15  
   From: 7/14/15      To: 7/15/15

Test Initiated: 7/15/15

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

**2. Enter percent effluent corresponding to the LC<sub>50</sub> below:**

LC<sub>50</sub> =      >37.0% effluent

95 % confidence limits: N/A

Method of LC<sub>50</sub> 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**

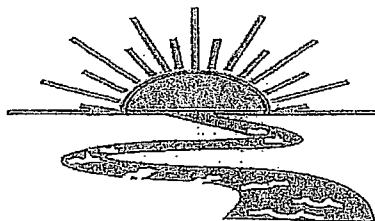
**Biomonitoring  
 Fathead Minnow 48 hour Acute Static Renewal  
 Chemical Parameters Chart\***

**Permittee: Camden Water Utilities**  
**NPDES Number: AR0022365/ AFIN 52-00073**  
**Contact: David Richardson**  
**Analyst: Briggs, Callahan, Rose**  
**Sample Collected From: Date 7/13/15 Time 0800**  
**To: Date 7/14/15 Time 0800**  
**Test Begin Date 7/15/15 Time 1430**  
**Test End Date 7/17/15 Time 1415**

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	7.9	8.0	7.8	25.0	25.0	25.1	28.0				44.0			7.4	7.4	7.4
12.0	7.9	8.0	7.8	25.0	25.0	25.1								7.2	7.5	7.3
16.0	7.9	8.0	7.8	25.0	25.0	25.1								7.1	7.5	7.3
21.0	7.9	8.0	7.7	25.0	25.0	25.1								7.1	7.5	7.4
28.0	7.9	8.0	7.7	25.0	25.0	25.1								7.0	7.5	7.4
37.0	7.9	8.0	7.7	25.0	25.0	25.1	32.0	36.0			44.0	40.0		7.0	7.5	7.4

\*This Form is to be submitted with each DMR.  
 Alkalinity and hardness to be reported as mg/l CaCO<sub>3</sub>

**APPENDIX F**  
**REPORT QUALITY ASSURANCE FORM**



# Bio-Analytical Laboratories

3240 Spurgin Road  
Post Office Box 527  
Doyline, LA 71023

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

## REPORT QUALITY ASSURANCE FORM

Client: Camden Water Utilities

Project#: X5797

Chain of Custody Documents Checked by: RC 7/29/15  
Technician/Date

Raw Data Documents Checked by: RC 7/29/15  
Technician/Date

Statistical Analysis Package Checked by: EGB 7/20/15  
Quality Manager/Date

Quality Control Data Checked by: EGB 7/20/15  
Quality Manager/Date

Report Checked by: Erin S. Bragg 7/30/15  
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  
Quality Manager

7/30/15  
Date

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

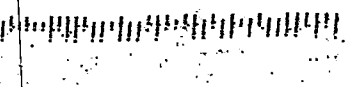


**Camden Water Utilities**

David Richardson, General Manager

P. O. Box J

Camden, AR 71711



**ADEQ**

Water Division-Enforcement Branch  
5301 Northshore Drive  
North Little Rock, AR 72118-5317