Bio-Analytical Laboratories (BAL)
ADEQ#88-0630
Project X4961

Bio-Analytical Laboratories' Executive Summary

Permittee: Camden Water Utilities
P.O. Drawer J
Camden, AR 71711
Project #: X4961
Outfall: Outfall 002
Permit #: AR0022365
Contact: David Richardson
Test Dates: December 12 - 14, 2012
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%), enter a "1"; otherwise, enter a "0" for Parameter No. TEM3D- 0.
2. Report the NOEC for survival, Parameter TOM3D - 37%.
3. Report the highest (critical dilution or control) Coefficient of Variation, Parameter TQM3D - 7.62%.

For *Pimephales promelas* (Fathead Minnow):
1. If the NOEC for survival is less than the critical dilution (28%), enter a "1"; otherwise, enter a "0" for Parameter No. TEM6C- 0.
2. Report the NOEC for survival, Parameter TOM6C - 37%.
3. Report the highest (critical dilution or control) Coefficient of Variation, Parameter TQM6C - 0.00%.

This report contains a total of 34 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 X4961

Test Dates: December 12 - 14, 2012
Report Date: January 7, 2013

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

Prepared by:
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Bio-Analytical Laboratories
P.O. Box 527
Doyline, LA 71023
ADEQ #88-0630

BAL
ADEQ #88-0630
Project X4961

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BAL
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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_{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 two 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.

2.3 Dilution Water

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

2.4 Test Concentrations

The test concentrations used in the acute toxicity tests were 37.0, 28.0, 21.0, 16.0 and 12.0 percent effluent and a reconstituted water control. The critical dilution was defined as 28 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 December 11 and 12, 2012. Upon completion of collection, the sample was chilled to 4^0 Celsius and delivered to Bio-Analytical Laboratories by BAL personnel.

2.6 Sample Preparation

Upon arrival, the sample was logged in, given an identification number and refrigerated unless needed. Prior to use, the sample was warmed to 25 ± 1^0 Celsius. The total residual chlorine level was measured with a Capital Controls^R amperometric titrator and recorded if present. The total ammonia level was 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 ± 1^0 Celsius. An AEMC^R data logger was used to monitor diurnal temperature throughout the testing period. Light cycle and intensity were recorded twice a month.

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2.8 Data Analysis

The NOEC and LC_{50} values values were obtained by approved EPA methods of analysis, using the ToxCalc statistical program.

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 percent effluent (p=.05).

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

Percent Effluent	Percent Survival	
Test Organism	*Daphnia pulex*	Fathead minnow
Control	95.0	100.0
12.0	82.5	100.0
16.0	77.5	97.5
21.0	85.0	100.0
28.0	90.0	100.0
37.0	75.0	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.

4.0 Conclusions

The two composite samples of Outfall 002 collected from Camden Water Utilities, Camden, Arkansas, on December 11 and 12, 2012, were not found to be lethally toxic to the *Daphnia pulex* test organisms nor the fathead minnow test organisms in the 28 percent critical dilution after 48 hours of exposure (p=.05).

5.0 Reference

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.

APPENDIX A
CHAIN-OF-CUSTODY DOCUMENTS

Laboratory Use Only:

Company: The City of Camden	Phone: (870) 836-4329	Analysis:									Lab Control Number:	Project Number: X4961

Address: P.O. Box J, Camden, AR 71711	Fax: (870) 836-5190	Chronic Ceriodaphnia	Chronic minnow	Acute minnow	Acute Daphnia species	Acute Ceriodaphnia						Temp. upon arrival:

Permit #: AR0022365	Purchase Order:											

Sampler's Signature: Mike Langley		Printed Name: Mike LANgley										Preservative: (below)

Date Start / Date End	Time Start / Time End	C	G	# containers	Sample Identification	Chronic Ceriodaphnia	Chronic minnow	Acute minnow	Acute Daphnia species	Acute Ceriodaphnia	Lab Control Number	Preservative
12-10-12 / 12-11-12	8:00 A / 8:0 A	X		2 1/2 Gallon JUGS	002			X	X		C6607	ICE

Relinquished by: Mike LANgley	Date: 12-12-12	Time: 9:45	Received by: [signature]	Date: 12-12-12	Time: 0945
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by: [signature]	Date: 12-12-12	Time: 1300	Received by laboratory: R Calleha	Date: 12/12/12	Time: 1300

Method of Shipment: __/__ Lab ____ Bus ____ Fed Ex ____ Airborne ____ UPS ____ Client ____ Other   Tracking # _____

Comments:

Temperature upon arrival: 4.3
Thermometer #: 29
Tech: RC
Date: 12/12/12

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Doyline, LA 71023
(318) 745-2772 Fax (318) 745-2773
bioanalytical@worldnet.att.net   LELAP #01975, EPA Code LA00917, OKDEQ #9513

Company: The City of Camden	Phone: (870) 836-4329
Address: P.O. Box J, Camden, AR 71711	Fax: (870) 836-5190
Permit #: AR0022365	Purchase Order:

Analysis:

Project Number: X4961

Temp. upon arrival:

Sampler's Signature: Mike Langley

Printed Name: Mike Langley

Date Start / Date End	Time Start / Time End	C	G	# containers	Sample Identification	Chronic Ceriodaphnia	Chronic minnow	Acute minnow	Acute Daphnia species	Acute Ceriodaphnia			Lab Control Number:	Preservative: (below)
12-11-12 / 12-12-12	8:00 g / 8:00 A	X		2 1/2 Gallon Jugs	002			X	X				C6608	ICE

Relinquished by: Mike Langley	Date: 12-12-12	Time: 9:45	Received by: [signature]	Date: 12-12-12	Time: 0945
Relinquished by:	Date:	Time:	Received by:	Date:	Time:
Relinquished by: [signature]	Date: 12-12-12	Time: 1300	Received by laboratory: R Callahan	Date: 12/12/12	Time: 1300

Method of Shipment: __Lab __ Bus ____ Fed Ex ____ Airborne ____ UPS ____ Client ____ Other   Tracking #_____

Comments:

Temperature upon arrival: 4.2
Thermometer #: 29
Tech: RC
Date: 12/12/12

APPENDIX B
RAW DATA SHEETS

BIO-ANALYTICAL LABORATORIES
ACUTE TOXICITY TEST WATER QUALITY DATA

Project# X4961

Client: CMDN/Camden Water Utilities

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

NPDES#AR0022365   Outfall 002

Technicians: EGB/AH/LGZ/RC

Test initiated: Date 12/12/12 Time 1550

Test terminated: Date 12/14/12 Time 1440

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 37%	Alkalinity 37%	Tech
Cld007	10.9/123.3%	Y/20/8.3 98.4%	<0.01	NO	1.0	N/A	52.0	48.0	AH
Cld008	9.6/111.6%	Y/20/8.5 98.0%	<0.01	↓	1.0	↓	44.0	52.0	AH
				↓		↓			

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	NO				
Soft H2O Rec H2O [AH 12/12/12]	3419					7.6	52.0	32.0	LGZ
	↓	↓		↓	↓				

Test Species Information

Test Species Info.	Species: D.pulex ID#: BAL A9-C10	Species: P.promelas ID#: BAL 121112	Species: ID#:	Species: ID#:
Age	<24h	2 d		
Test Container Size	30ml	250ml		
Test volume	25ml	200ml		
Feeding: Type	VCT: Algae	Artemia		
Amount	Fed 2hrs prior to test initiation			
Aeration? Amount	NA	NA		
Condition of survivors	Good AH 12/14/12 ——→			

Comments:

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

Project# X4961

Client Camden Water

Sample Description 002

Test started: Date 12/12/12   Time 1550

Test ended: Date 12/14/12   Time 1435

Test Species D. pulex   ID# BAL/Aq.C10

Technician: Ohour AH   24hour AH   48hour AH   72hour _____   96hour _____
Time: Ohour 1550   24hour 1650   48hour 1435   72hour _____   96hour _____
Temperature (°C):   Ohour 24.9   24hour 21.6   48hour 24.9   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
100 AH 12/12/12	A	4A	8	8	8			8.4	8.3	8.2		RC 10/14/8	7.9	7.8	7.8			76.1	182.3	77.4 21.7		
	B		8	8	7																	
	C		8	8	7																	
	D		8	8	8																	
	E		8	8	8																	
OC	A		8					Omit / 12/12/12 / RC														
	B		8																			
	C		8																			
	D		8																			
	E		8																			
Chemistry Tech prerenewal/postrenewal								RC RC AH	AH				RC RC AH	AH				RC RC AH	AH			

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

Project# X4961

Client Camden Water

Sample Description OO2

Test started: Date 12/12/12   Time 1550

Test ended: Date 12/14/12   Time 1435

Test Species D. pulex   ID# BAL/Aq-C10

	Ohour	24hour	48hour	72hour	96hour
Technician:	AH	AH	AH		
Time:	1550	1650	1435		
Temperature (°C):	24.9	24.6	24.9		

Test Dilution	Replicate	Test Salinity	# Live Organisms					Dissolved Oxygen					pH					Conductivity				
		NA	0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
12	A		8	8	8			8.4	7.9/8.3	8.1			8.0	7.5/7.9	7.7			204	214/204	237		
	B		8	8	5																	
	C		8	8	8/6																	
	D		8	7	6	**R14/12																
	E		8	7	6																	
16	A		8	7	7			8.4	7.9/8.3	8.1			8.0	7.9/7.9	7.8			210	229/213	210		
	B		8	8	8																	
	C		8	6	6																	
	D		8	6	5																	
	E		8	6	5																	

Chemistry Tech
prerenewal/postrenewal

		Dissolved Oxygen			pH			Conductivity	
		RC	AH/RC AH		RC	AH/RC AH		RC	AH/RC AH

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

Project# X4961

Client Camden Water

Sample Description 002

Test started: Date 2/12/12 Time 1550

Test ended: Date 2/14/12 Time 1435

Test Species D. pulex ID# BAU A9-C10

Technician: Ohour AH 24hour AH 48hour DH 72hour_____ 96hour_____

Time: Ohour 1550 24hour 1650 48hour 1435 72hour_____ 96hour_____

Temperature (°C): Ohour 24.9 24hour 24.6 48hour 24.9 72hour_____ 96hour_____

Test Dilution	Replicate	Test Salinity	# Live Organisms					Dissolved Oxygen					pH					Conductivity				
		NA	0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
21	A		8	8	8			8.4	7.6/8.3	8.0			8.0	7.6/8.0	7.7			222	238/221	253		
	B		8	8	8																	
	C		8	6	4																	
	D		8	7	6																	
	E		8	8	8																	
28	A		8	7	7			8.4	7.6/8.3	7.9			8.0	7.6/8.0	7.7			234	244/243	265		
	B		8	7	7																	
	C		8	7	7																	
	D		8	7	7																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal								RC/RC AH	AH				RC/RC AH	AH				RC/RC AH	AH			

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

Project# X4961

Client Camden Water

Sample Description 002

Test started: Date 12/2/12 Time 1550

Test ended: Date 12/4/12 Time 1435

Test Species D. pulex ID# BAY AG-C10

	Ohour	24hour	48hour	72hour	96hour
Technician:	AH	AH	AH		
Time:	1550	1650	1435		
Temperature (°C):	24.9	24.6	24.9		

Test Dilution	Replicate	Test Salinity	# Live Organisms					Dissolved Oxygen					pH					Conductivity				
		NA	0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
37	A		8	6	6			8.4	7.5/8.3	7.8			8.0	7.9/8.0	7.9			256/258	268/8.2.2			
	B		8	8	4																	
	C		8	7	7																	
	D		8	7	6																	
	E		8	8	7																	
	A		8						/					/					/			
	B		8																			
	C		8																			
	D		8																			
	E		8																			
Chemistry Tech prerenewal/postrenewal								RC/RC AH	AH				RC/RC AH	AH				RC/RC AH	AH			

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

Project# X4961

Client Camden Water

Sample Description 002

Test started: Date 12/12/12   Time 1625

Test ended: Date 12/14/12   Time 1440

Test Species P. promelas   ID# BAL 121112

Technician: Ohour RC   24hour AH   48hour AH   72hour _____   96hour _____
Time: Ohour 1625   24hour 1711   48hour 1440   72hour _____   96hour _____
Temperature (°C): Ohour 24.8   24hour 24.6   48hour 24.9   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
		11A																				
A			8	8	8			8.4	8.3	7.7			7.9	7.8	7.5			176.1	177.4	183.3		
AH 12/12/12	B			8	8	8																	
	C			8	8	8																	
	D			8	8	8																	
	E			8	8	8																	
OK	A		8					omit 12/12/12 RC															
	B		8																				
	C		8																				
	D		8																				
	E		8																				

Chemistry Tech
prerenewal/postrenewal

| | | | RC AH/RC AH | | | | | | | | | | RC AH/RC AH | | | | | RC AH/RC AH | | | | |

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

Project# X4961

Client Camden Water

Sample Description 002

Test started: Date 12/12/12 Time 1625

Test ended: Date 12/14/12 Time 1440

Test Species P. promelas ID# BAL 121112

Technician: Ohour RC 24hour AH 48hour AH 72hour____ 96hour____

Time: Ohour 1625 24hour 710 48hour 1440 72hour____ 96hour____

Temperature (°C): Ohour 24.8 24hour 24.6 48hour 24.9 72hour____ 96hour____

Test Dilution	Replicate	Test Salinity	# Live Organisms					Dissolved Oxygen					pH					Conductivity				
		11A	0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
12	A		8	8	8			8.4	8.4/8.3	7.7			8.0	7.8/7.9	7.6			204	207/207	211		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
16	A		8	8/7	8			8.4	8.4/8.3	7.7			8.0	7.8/7.9	7.6			210	252/213	219		
	B		8	8	7																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	

Chemistry Tech prerenewal/postrenewal: RC AH/RC AH | RC AH/RC AH | RC AH/RC AH

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

Project# X4961

Client Camden Water

Sample Description 002

Test started: Date 12/12/12 Time 1625

Test ended: Date 12/14/12 Time 1440

Test Species P. promelas ID# BAL 121112

Technician: Ohour RC 24hour AH 48hour AH 72hour ___ 96hour ___
Time: Ohour 1625 24hour 1710 48hour 1440 72hour ___ 96hour ___
Temperature (°C): Ohour 24.8 24hour 24.6 48hour 24.9 72hour ___ 96hour ___

Test Dilution	Replicate	Test Salinity	# Live Organisms					Dissolved Oxygen					pH					Conductivity				
		11A	0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
21	A		8	8	8			8.4	8.1/8.3	7.7			8.0	7.8/8.0	7.7			222	216/227	232		
	B		8	8	8																	
	C		8	8 12/13/12	8																	
	D		8	AH 12/13/12	8																	
	E		8	8	8																	
28	A		8	AH 12/12	8			8.4	8.1/8.3	7.7	RC 8 AH 12	8.0	7.8/8.0	7.7			234	216/243	248		
	B		8	AH 12/13/12	8																	
	C		8	AH 12/13/12	8																	
	D		8	AH 12/13/12	8																	
	E		8	8	8																	

Chemistry Tech
prerenewal/postrenewal RC AH/RC AH RC AH/RC AH RC AH/RC AH

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

Project# __X4961__

Client __Camden Water__

Sample Description __002__

Test started: Date 13/12/12   Time 1625

Test ended: Date 12/14/12   Time 1440

Test Species __P. promelas__   ID# BAL 121112

	Ohour	24hour	48hour	72hour	96hour
Technician:	RC	AH	AH		
Time:	1625	1710	1440		
Temperature (°C):	24.8	24.6	24.9		

Test Dilution	Replicate	Test Salinity	# Live Organisms					Dissolved Oxygen					pH					Conductivity				
		1/A	0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
37	A		8	8 10.8	8			8.4	8.4 8.3	7.6			8.0	7.9 8.0	7.8			256	258 268	274		
	B		8	8	8																	
	C		8	8 AH 12/12/12	8																	
	D		8	8 7 AH 12/12/12	8																	
	E		8	8	8																	
	A		8																			
	B		8																			
	C		8																			
	D		8																			
	E		8																			
Chemistry Tech prerenewal/postrenewal								RC	AH/RC	AH			RC	AH/RC	AH			RC	AH/RC	AH		

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APPENDIX C
STATISTICAL ANALYSIS

Daphnid Acute Test-48 Hr Survival

Start Date:	12/12/2012	Test ID:	X4961DP	Sample ID:	2
End Date:	12/14/2012	Lab ID:	ADEQ880630	Sample Type:	EFF1-POTW
Sample Date:	12/12/2012	Protocol:	EPAAW02-EPA/821/R-02-01	Test Species:	DP-Daphnia pulex

Comments:

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

			Transform: Arcsin Square Root					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
D-Control	0.9500	1.0000	1.3196	1.2094	1.3931	7.623	5			
12	0.8250	0.8684	1.1585	0.9117	1.3931	19.095	5	1.345	2.360	0.2829
16	0.7750	0.8158	1.0946	0.9117	1.3931	18.911	5	1.877	2.360	0.2829
21	0.8500	0.8947	1.2024	0.7854	1.3931	23.043	5	0.978	2.360	0.2829
28	0.9000	0.9474	1.2462	1.2094	1.3931	6.591	5	0.613	2.360	0.2829
37	0.7500	0.7895	1.0597	0.7854	1.2094	16.371	5	2.168	2.360	0.2829

Auxiliary Tests					Statistic		Critical		Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution (p > 0.05)					0.97		0.927		-0.3177	-0.3261
Bartlett's Test indicates equal variances (p = 0.23)					6.82014		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	0.19733	0.21033	0.04659	0.03592	0.29814	5, 24
Treatments vs D-Control										

ToxCalc v5.0.23 Reviewed by: ELB 12/26/12

Acute Fish Test-48 Hr Survival

| Start Date: | 12/12/2012 | Test ID: | X4961PP | Sample ID: | 2 |
| End Date: | 12/14/2012 | Lab ID: | ADEQ880630 | Sample Type: | EFF1-POTW |
| Sample Date: | 12/12/2012 | 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	0.8750	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

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

ToxCalc v5.0.23

Reviewed by:_____

APPENDIX D
QUALITY ASSURANCE CHARTS

48-hour Acute Reference Toxicant Test Results for Daphnia pulex

CV% = 29.9
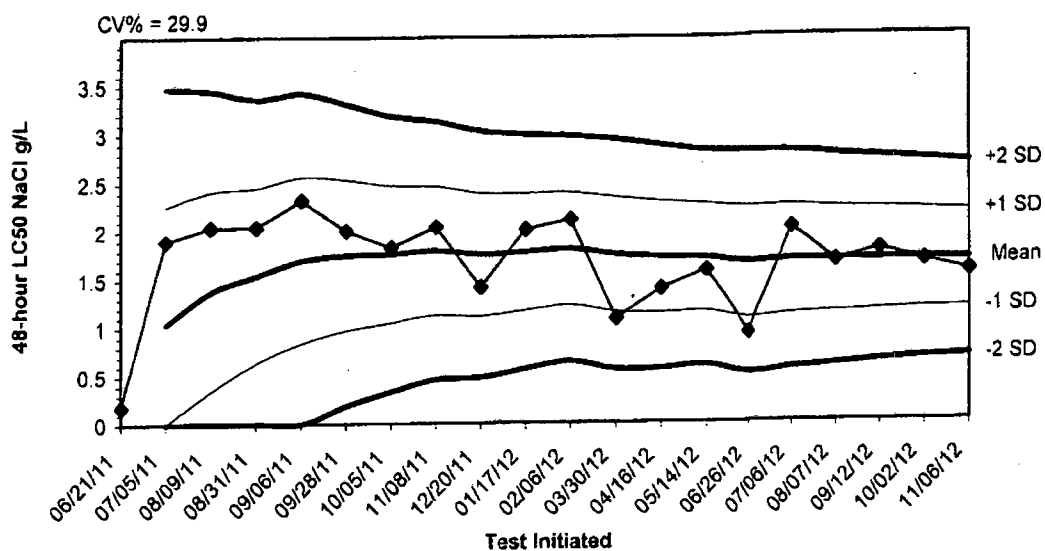
Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
06/21/11	0.1800					
07/05/11	1.9000	1.0400	0.0000	0.0000	2.2562	3.4724
08/09/11	2.0400	1.3733	0.3375	0.0000	2.4092	3.4450
08/31/11	2.0400	1.5400	0.6309	0.0000	2.4491	3.3581
09/06/11	2.3200	1.6960	0.8349	0.0000	2.5571	3.4182
09/28/11	2.0000	1.7467	0.9665	0.1864	2.5268	3.3069
10/05/11	1.8300	1.7586	1.0457	0.3329	2.4714	3.1843
11/08/11	2.0400	1.7938	1.1263	0.4589	2.4612	3.1286
12/20/11	1.4100	1.7511	1.1138	0.4765	2.3884	3.0257
01/17/12	2.0100	1.7770	1.1706	0.5642	2.3834	2.9898
02/06/12	2.1100	1.8073	1.2233	0.6393	2.3912	2.9752
03/30/12	1.0800	1.7467	1.1516	0.5565	2.3417	2.9368
04/16/12	1.3900	1.7192	1.1410	0.5627	2.2975	2.8757
05/14/12	1.5800	1.7093	1.1525	0.5957	2.2661	2.8229
06/26/12	0.9200	1.6567	1.0827	0.5088	2.2306	2.8046
07/06/12	2.0100	1.6788	1.1173	0.5558	2.2402	2.8017
08/07/12	1.6600	1.6776	1.1340	0.5903	2.2213	2.7650
09/12/12	1.7800	1.6833	1.1553	0.6273	2.2113	2.7393
10/02/12	1.6600	1.6821	1.1690	0.6558	2.1953	2.7084
11/06/12	1.5500	1.6755	1.1752	0.6748	2.1758	2.6762

2012 48-hour Reference Toxicant Test Results for Pimephales promelas

CV% = 9.16
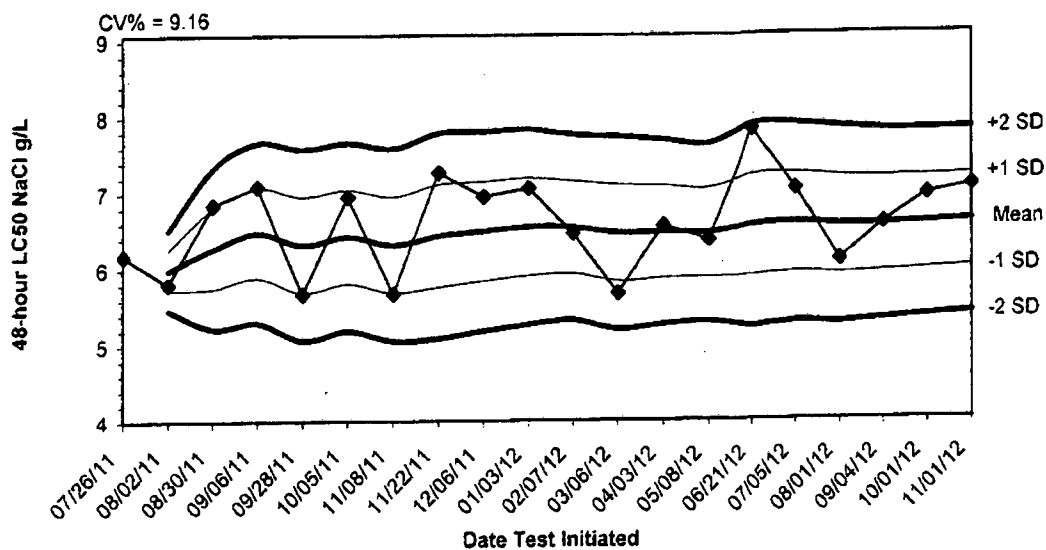
Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
07/26/11	6.1800					
08/02/11	5.8100	5.9950	5.7334	5.4717	6.2566	6.5183
08/30/11	6.8500	6.2800	5.7528	5.2257	6.8072	7.3343
09/06/11	7.0900	6.4825	5.8915	5.3005	7.0735	7.6645
09/28/11	5.6700	6.3200	5.6923	5.0646	6.9477	7.5754
10/05/11	6.9500	6.4250	5.8075	5.1899	7.0425	7.6601
11/08/11	5.6700	6.3171	5.6853	5.0535	6.9490	7.5808
11/22/11	7.2700	6.4363	5.7612	5.0862	7.1113	7.7863
12/06/11	6.9500	6.4933	5.8391	5.1848	7.1476	7.8018
01/03/12	7.0600	6.5500	5.9077	5.2653	7.1923	7.8347
02/07/12	6.4600	6.5418	5.9318	5.3219	7.1518	7.7618
03/06/12	5.6700	6.4692	5.8355	5.2017	7.1029	7.7366
04/03/12	6.5600	6.4762	5.8689	5.2616	7.0834	7.6907
05/08/12	6.3700	6.4686	5.8845	5.3003	7.0527	7.6368
06/21/12	7.8200	6.5587	5.8964	5.2342	7.2209	7.8832
07/05/12	7.0300	6.5881	5.9376	5.2870	7.2387	7.8892
08/01/12	6.0900	6.5588	5.9174	5.2761	7.2002	7.8416
09/04/12	6.5700	6.5594	5.9372	5.3150	7.1817	7.8039
10/01/12	6.9500	6.5800	5.9687	5.3574	7.1913	7.8026
11/01/12	7.0600	6.6040	5.9994	5.3948	7.2086	7.8132

APPENDIX E
AGENCY FORMS

Acute Forms
Daphnia pulex Survival

Permittee: Camden Water Utilities
NPDES Permit Number: AR0022365
Composite Collected   **From: 12/10/12**   **To: 12/11/12**
                              From: 12/11/12   **To: 12/12/12**

Test Initiated: 12/12/12
Dilution Water Used: **Receiving Water   X   Reconstituted Water**

Dilution Series Results - Percent Survival

TIME OF READING	REP	0	12	16	21	28	37
24-hour	A	100	100	87.5	100	87.5	75.0
	B	100	100	100	100	87.5	100
	C	100	100	75.0	75.0	87.5	87.5
	D	100	87.5	75.0	87.5	87.5	87.5
	E	100	87.5	75.0	100	100	100
48-hour	A	100	100	87.5	100	87.5	75.0
	B	87.5	62.5	100	100	87.5	50.0
	C	87.5	100	75.0	50.0	87.5	87.5
	D	100	75.0	62.5	75.0	87.5	75.0
	E	100	75.0	62.5	100	100	87.5
	Mean	95.0	82.5	77.5	85.0	90.0	75.0

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%)   YES   X   NO
b.)½ LOW FLOW OR 2X CRITICAL DILUTION (N/A%)   YES   NO
2. Enter percent effluent corresponding to the LC_{50} below:
    LC_{50} =   N/A% 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

Permittee: Camden Water Utilities
NPDES Number: AR0022365
Contact: David Richardson
Analyst: Haughton
Sample Collected   **From:**   **Date 12/10/12**   **Time 0800**
                          To: **Date 12/11/12**   **Time 0800**
Test Begin   **Date 12/12/12**   **Time 1550**
Test End   **Date 12/14/12**   **Time 1435**

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	8.4	8.3	8.2	24.9	24.6	24.9	32.0			52.0			7.9	7.8	7.8
12	8.4	8.3	8.1	24.9	24.6	24.9							8.0	7.9	7.7
16	8.4	8.3	8.1	24.9	24.6	24.9							8.0	7.9	7.8
21	8.4	8.3	8.0	24.9	24.6	24.9							8.0	8.0	7.7
28	8.4	8.3	7.9	24.9	24.6	24.9							8.0	8.0	7.7
37	8.4	8.3	7.8	24.9	24.6	24.9	48.0	52.0		52.0	44.0		8.0	8.0	7.9

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

Acute Forms
Fathead Minnow Survival

Permittee: Camden Water Utilities
NPDES Permit Number: AR0022365
Composite Collected   From: 12/10/12   To: 12/11/12
                             From: 12/11/12   To: 12/12/12
Test Initiated: 12/12/12
Dilution Water Used: Receiving Water   X   Reconstituted Water

Dilution Series Results - Percent Survival

TIME OF READING	REP	0	12	16	21	28	37
24-hour	A	100	100	100	100	100	100
	B	100	100	100	100	100	100
	C	100	100	100	100	100	100
	D	100	100	100	100	100	100
	E	100	100	100	100	100	100
48-hour	A	100	100	100	100	100	100
	B	100	100	87.5	100	100	100
	C	100	100	100	100	100	100
	D	100	100	100	100	100	100
	E	100	100	100	100	100	100
	Mean	100	100	97.5	100	100	100

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%)   YES   X   NO
b.)½ LOW FLOW OR 2X CRITICAL DILUTION (N/A%)   YES   NO
2. Enter percent effluent corresponding to the LC_{50} below:
     LC_{50} =   N/A% 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
**Fathead Minnow 48 hour Acute Static Renewal**
Chemical Parameters Chart*

Permittee: Camden Water Utilities
NPDES Number: AR0022365
Contact: David Richardson
Analyst: Callahan ,Haughton

Sample Collected	From:	Date 12/10/12	Time 0800
	To:	Date 12/11/12	Time 0800
Test Begin		Date 12/12/12	Time 1625
Test End		Date 12/14/12	Time 1440

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	8.4	8.3	7.7	24.8	24.6	24.9	32.0			52.0			7.9	7.8	7.5
12	8.4	8.3	7.7	24.8	24.6	24.9							8.0	7.9	7.6
16	8.4	8.3	7.7	24.8	24.6	24.9							8.0	7.9	7.6
21	8.4	8.3	7.7	24.8	24.6	24.9							8.0	8.0	7.7
28	8.4	8.3	7.7	24.8	24.6	24.9							8.0	8.0	7.7
37	8.4	8.3	7.6	24.8	24.6	24.9	48.0	52.0		52.0	44.0		8.0	8.0	7.8

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

APPENDIX F
REPORT QUALITY ASSURANCE FORM
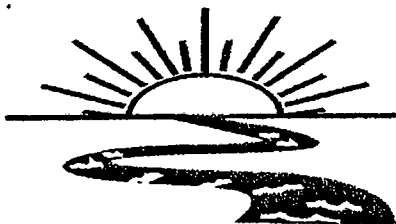
Bio-Analytical Laboratories

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 (v. 31612)

Client: Camden Water

Project#: X4961

Chain of Custody Documents Checked by: AH 12/20/12
Technician/Date

Raw Data Documents Checked by: AH 12/20/12
Technician/Date

Statistical Analysis Package Checked by: EGB 12/26/12
Quality Manager/Date

Quality Control Data Checked by: EGB 11/26/12
**Quality Manager/Date**

Report Checked by: EGB 1/7/13
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.

Erin S. Briggs   1/7/13
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.

CAMDEN WATER UTILITIES
P.O. DRAWER J
CAMDEN AR 71711
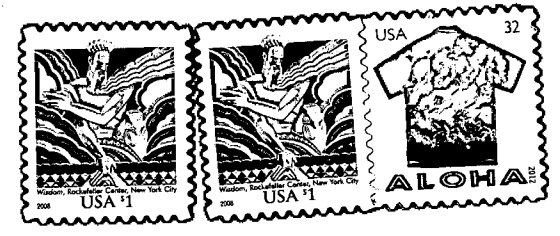
A. D. E. Q.
NPDES ENFORCEMENT DIV.
5301 NORTHSHORE DR.
N. LITTLE ROCK AR 72118-5317