

Bio-Analytical Laboratories (BAL)
ADEQ#88-0630
Project X5148

Bio-Analytical Laboratories' Executive Summary

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

Project #: X5148

Outfall: Outfall 002 (treated municipal wastewater)

Permit #: AR0022365/ AFIN 52-00073

Contact: David Richardson

Test Dates: June 19 - 21, 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:

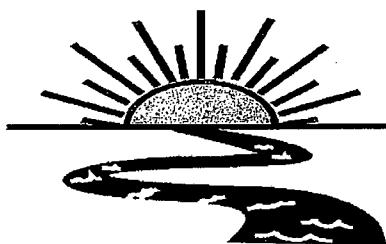
For *Daphnia pulex*:

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 - 12.12%.

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 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.



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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 X5148

**Test Dates: June 19 - 21, 2013
Report Date: July 18, 2013**

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

Prepared by:
Ginger Briggs
Bio-Analytical Laboratories
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ADEQ #88-0630

BAL
ADEQ #88-0630
Project X5148

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Project X5148

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 three 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.

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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 June 18 and 19, 2013. Upon completion of collection, the samples were chilled to approximately 6.0° Celsius and delivered to Bio-Analytical Laboratories by BAL personnel.

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.

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2.8 Data Analysis

The NOEC and LC₅₀ 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 37.0 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	92.5	100.0
12.0	90.0	100.0
16.0	82.5	100.0
21.0	90.0	100.0
28.0	90.0	100.0
37.0	97.5	97.5

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

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4.0 Conclusions

The two composite samples of Outfall 002 collected from Camden Water Utilities, Camden, Arkansas, on June 18 and 19, 2013, were not found to be lethally toxic to the fathead minnow test organisms nor the *Daphnia pulex* test organisms in the 28 percent critical dilution after 48 hours of exposure ($p=.05$).

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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. 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: X5148 Temp. upon arrival: temperature upon arrival: 1.1°C Thermometer #: 29 Tech. Date: 6/19/13 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	
Permit #: AR0022365/ AFIN 52-00073		Purchase Order:		Acute Mysid			Acute Ceriodaphnia	
Sampler's Signature/Printed Name/Affiliation: Annette Strickland / Annette Strickland				fecal Coliform				
Date Start Date End	Time Start Time End	C	G	# and type of container	Sample Identification			
6-17-13 6-18-13	8 Am 6 Am	X		2 half gallons	002		CT582 ICE	
Relinquished by/Affiliation: Annette Strickland		Date: 6-19-13	Time: 1020	Received by/Affiliation: J. B. [Signature]		Date: 6-19-13	Time: 1020	
Relinquished by/Affiliation:		Date:	Time:	Received by/Affiliation:		Date:	Time:	
Relinquished by/Affiliation: J. B. [Signature]		Date: 6-19-13	Time: 1310	Received by/Affiliation: L. Colby		Date: 6/19/13	Time: 1310	
Method of Shipment: <input type="checkbox"/> Lab <input type="checkbox"/> Bus <input type="checkbox"/> Fed Ex <input type="checkbox"/> DHL <input type="checkbox"/> UPS <input type="checkbox"/> Client <input type="checkbox"/> Other <input type="checkbox"/> Tracking # _____								
Comments:								



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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: X5148 Temp. upon arrival: thermometer #: Tech. Date: 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: Annette Strickland ANNETTE STRICKLAND																
Date Start Date End	Time Start Time End	C	G								# and type of container	Sample Identification		Temperature upon arrival: 1.12 01/13		
6-18-13 6-19-13	8 AM 6 AM	X		2 half gallons	002		07583 ICE									
Relinquished by/Affiliation: Annette Strickland				Date: 6-19-13	Time: 10:20	Received by/Affiliation: LBJ		Date: 6-19-13	Time: 10:20							
Relinquished by/Affiliation:				Date:	Time:	Received by/Affiliation:		Date:	Time:							
Relinquished by/Affiliation: LBJ				Date: 6-19-13	Time: 1:30	Received by/Affiliation: S. C. Cottrell		Date: 6/19/13	Time: 1:30							
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 <input type="checkbox"/> Tracking # _____																
Comments:																

APPENDIX B
RAW DATA SHEETS

BIO-ANALYTICAL LABORATORIES
ACUTE TOXICITY TEST WATER QUALITY DATA

Project# XS148

Client: CMDN/Camden Water Utilities

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

NPDES#AR0022365 Outfall 002

Technicians: EGB/AH/LGZ/REGO

Test initiated: Date 6/19/13 Time 1325

Test terminated: Date 6/21/13 Time 1340

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%	
C7582	8.2/110.5%	7/13 7.7/94.6%	<0.01	NO	0.25	N/A	56.0	24.0	LC
C7583	8.4/100.2%	NO	<0.01		0.25		56.0	28.0	LC

Dilution Water Information

Dilution Water	ID#	Initial D.O. (mg/L & %)	Aerate? Minutes/D.O. (mg/L & %)	Total Residual Chlorine (mg/L)	Ammonia (NH3) mg/L	pH	Hardness	Alkalinity	Tech
SOFT H2O		NA	NA	NA	NA				
Rec H2O	3507					7.0	48.0	32.0	AH

Test Species Information

Test Species Info.	Species: ID#	Species: ID#	Species: ID#	Species: ID#
	<u>D. pulex</u> BA144+J5	<u>Promelas</u> BA166+L3		
Age	24h	3 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
LC
6/21/13

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

Project# X5148

Test started: Date 6/19/13

Time 1525

Client Camden

Test ended: Date 6/21/13

Time 1335

Sample Description 002

Test Species D. pulex

ID# BAU H4 + JS

Technician: 0hour LC 24hour AK 48hour SW 72hour SW 96hour SW

Time: 0hour 1525 24hour 1435 48hour 1335 72hour SW 96hour SW

Temperature (°C): 0hour 24.9 24hour 24.5 48hour 24.0 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			
SV	A	NA	8	6	6			83	81	82	77			74	75	74	7.5			1678	1708	1678	230		
	B		8	8	8																				
	C		8	8	7																				
	D		8	8	8																				
	E		8	8	8																				
OP	A		8																						
	B		8																						
	C		8																						
	D		8																						
	E		8																						
Chemistry Tech prerenewal/postrenewal									SW	SW	SW			SW	SW	SW				SW	SW	SW			

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

Project# X5148

Test started: Date 6/19/13

Time 1525

Client Camden

Test ended: Date 6/21/13

Time 1335

Sample Description 002

Test Species D. pulex

ID# BAL H44JS

Technician: Ohour SC 24hour AH 48hour SW 72hour 96hour

Time: Ohour 1525 24hour 1435 48hour 1335 72hour 96hour

Temperature (°C): Ohour 24.9 24hour 24.5 48hour 24.0 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		
12	A	NA	8	8	8			8.2	8.1	7.2	7.8			7.3	7.4	7.3	7.5			183.7	193.6	191.7	258	
	B		8	8	8																			
	C		8	8	8																			
	D		8	8	8																			
	E		8	5	4																			
16	A		8	6	5			8.2	8.1	7.2	7.8			7.3	7.4	7.3	7.6			188.6	192.4	189.6	257	
	B		8	7	7																			
	C		8	6	6																			
	D		8	8	8																			
	E		8	8	7																			
Chemistry Tech prerenewal/postrenewal								SW	AH	SW				SW	AH	SW				SW	AH	SW		

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

Project# X5148

Test started: Date 6/19/13

Time 1325

Client Camden

Test ended: Date 6/21/13

Time 1335

Sample Description 002

Test Species D. pulex

ID# BAL/H4TJ5

Technician: Ohour SC 24hour AH 48hour SW 72hour 96hour

Time: Ohour 1325 24hour 1435 48hour 1335 72hour 96hour

Temperature (°C): Ohour 24.9 24hour 24.5 48hour 24.0 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
21	A	NA	8	8	7			8.2	8.1 8.2	7.7			7.4	7.4 7.4	7.6			75.6	202 190.0	235		
	B		8	8	6																	
	C		8	8	7																	
	D		8	8	8																	
	E		8	8	8																	
28	A		8	7	7			8.1	8.1 8.2	7.7			7.4	7.4 7.1	7.6			208	215 208	270		
	B		8	6	6																	
	C		8	8	8																	
	D		8	7	7																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal								SW	AH AH	SW			SW	AH AH	SW			SW	AH AH	SW		

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

Project# X5148

Test started: Date 6/19/13 Time 1525

client Camden

Test ended: Date 6/21/13 Time 1335

Sample Description 002

Test Species D. pulex ID# BAL/H4T5

Technician: 0hour SC 24hour PH 48hour SW 72hour PH 96hour PH

Time: 0hour 1525 24hour 1435 48hour 1335 72hour PH 96hour PH

Temperature (°C): 0hour 24.9 24hour 21.5 48hour 21.6 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				
37	A	NA	8	7	7			8.1	8.1	7.7			7.4	7.3	7.0	7.6			221	220	220	223				
	B		8	8	8																					
	C		8	8	8																					
	D		8	8	8																					
	E		8	8	8																					
A B C D E (diagonal line)			8																							
			8																							
			8																							
			8																							
			8																							
Chemistry Tech prerenewal/postrenewal								SW	PH	PH	SW			SW	PH	PH	SW			SW	PH	PH	SW			

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

Project# X5148

Test started: Date 6/19/13 Time 1210

Client Camden

Test ended: Date 6/21/13 Time 1340

Sample Description 002

Test Species P. promelas ID# BAU10160

Technician: Ohour sw 24hour jc 48hour jc 72hour jc 96hour jc
 Time: Ohour 1540 24hour 1430 48hour 1340 72hour jc 96hour jc
 Temperature (°C): Ohour 24 24hour 24 48hour 25.0 72hour jc 96hour jc

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	
SV	A	NA	8	8	8			8.3	8.0	7.1			7.4	7.3	7.3			167.5	190	195			
	B		8	8	8																		
	C		8	8	8																		
	D		8	8	8																		
	E		8	8	8																		
OR	A		8																				
	B		8																				
	C		8																				
	D		8																				
	E		8																				
Chemistry Tech prerenewal/postrenewal								sw	jc	jc			sw	7	jc	jc			sw	jc	jc		

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

Project# X5148

Test started: Date 6/11/13 Time 1540

Client Camden

Test ended: Date 6/11/13 Time 1340

Sample Description 002

Test Species P. promelas ID# BA/616/13

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

Time: Ohour 1540 24hour 1430 48hour 1340 72hour SL 96hour SL

Temperature (°C): Ohour 24°C 24hour 24 48hour 25 72hour SL 96hour SL

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		
12	A	NA	8	8	8			8.2	7.9	8.2	6.8			7.3	7.3	7.2			183.7	192	184	210		
	B		8	8	8																			
	C		8	8	8																			
	D		8	8	8																			
	E		8	8	8																			
16	A		8	8	8			8.2	7.9	8.2	6.8			7.3	7.2	7.2			188.6	200	181	218		
	B		8	8	8																			
	C		8	8	8																			
	D		8	8	8																			
	E		8	8	8																			
Chemistry Tech prerenewal/postrenewal								SL	SL	SL	SL			SL	SL	SL			SL	SL	SL			

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

Project# XS148

Test started: Date 6/19/13 Time 1500

Client Camden

Test ended: Date 6/21/13 Time 1340

Sample Description 002

Test Species P. promelas ID# BAJ 6163

Technician: Ohour SW 24hour JC 48hour JC 72hour 96hour
 Time: Ohour 1540 24hour 1430 48hour 1300 72hour 96hour
 Temperature (°C): Ohour 24.0 24hour 24 48hour 25 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		
21	A	NA	8	8	8			8.2	7.9	8.0	6.9			7.4	7.2	7.2			195	203	196.5	202		
	B		8	8	8																			
	C		8	8	8																			
	D		8	8	8																			
	E		8	8	8																			
28	A		8	8	8			8.1	7.9	8.0	7.0			7.4	7.2	7.2			208	215	208.5	213		
	B		8	8	8																			
	C		8	8	8																			
	D		8	8	8																			
	E		8	8	8																			
Chemistry Tech prerenewal/postrenewal																								

ACUTE2 020809 Rev.

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

Project# XS148

Test started: Date 6/19/13 Time 1330

Client Camden

Test ended: Date 6/21/13 Time 1340

Sample Description 002

Test Species P. promelas ID# PAJ 6/6/3

Technician: Ohour gld 24hour LC 48hour LC 72hour LC 96hour LC
 Time: Ohour 1540 24hour 1430 48hour 1340 72hour LC 96hour LC
 Temperature (°C): Ohour 24.0 24hour 24 48hour 25 72hour LC 96hour LC

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		
37	A	NA	8	8	8			8.1	7.8	8.2	7.0			7.4	7.2	7.3			221	237	221	260		
	B		8	8	7																			
	C		8	8	8																			
	D		8	8	8																			
	E		8	8	8																			
	A		8																					
	B		8																					
	C		8																					
	D		8																					
	E		8																					
Chemistry Tech prerenewal/postrenewal							gld/LC JJC/LC					gld/LC JJC/LC					gld/LC JJC/LC							

APPENDIX C
STATISTICAL ANALYSIS

Daphnid Acute Test-48 Hr Survival

Start Date: 6/19/2013 Test ID: X5148DP Sample ID: AR0022365 NPDES 002
 End Date: 6/21/2013 Lab ID: ADEQ880630 Sample Type: EFF1-POTW
 Sample Date: 6/18/2013 Protocol: EPAAW02-EPA/821/R-02-01 Test Species: DP-Daphnia pulex
 Comments:

Conc-%	1	2	3	4	5
D-Control	0.7500	1.0000	0.8750	1.0000	1.0000
12	1.0000	1.0000	1.0000	1.0000	0.5000
16	0.6250	0.8750	0.7500	1.0000	0.8750
21	0.8750	0.7500	0.8750	1.0000	1.0000
28	0.8750	0.7500	1.0000	0.8750	1.0000
37	0.8750	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	0.9250	1.0000	1.2872	1.0472	1.3931	12.116	5			
12	0.9000	0.9730	1.2715	0.7854	1.3931	21.373	5	29.00	16.00	
16	0.8250	0.8919	1.1542	0.9117	1.3931	15.823	5	22.00	16.00	
21	0.9000	0.9730	1.2504	1.0472	1.3931	11.683	5	25.50	16.00	
28	0.9000	0.9730	1.2504	1.0472	1.3931	11.683	5	25.50	16.00	
37	0.9750	1.0541	1.3564	1.2094	1.3931	6.055	5	30.50	16.00	

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.89547	0.927	-1.2028	1.62483
Bartlett's Test indicates equal variances (p = 0.40)	5.13374	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: 6/19/2013 Test ID: X5148PP Sample ID: AR0022365 NPDES 002
 End Date: 6/21/2013 Lab ID: ADEQ880630 Sample Type: EFF1-POTW
 Sample Date: 6/18/2013 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	1.0000
16	1.0000	1.0000	1.0000	1.0000	1.0000
21	1.0000	1.0000	1.0000	1.0000	1.0000
28	1.0000	1.0000	1.0000	1.0000	1.0000
37	1.0000	0.8750	1.0000	1.0000	1.0000

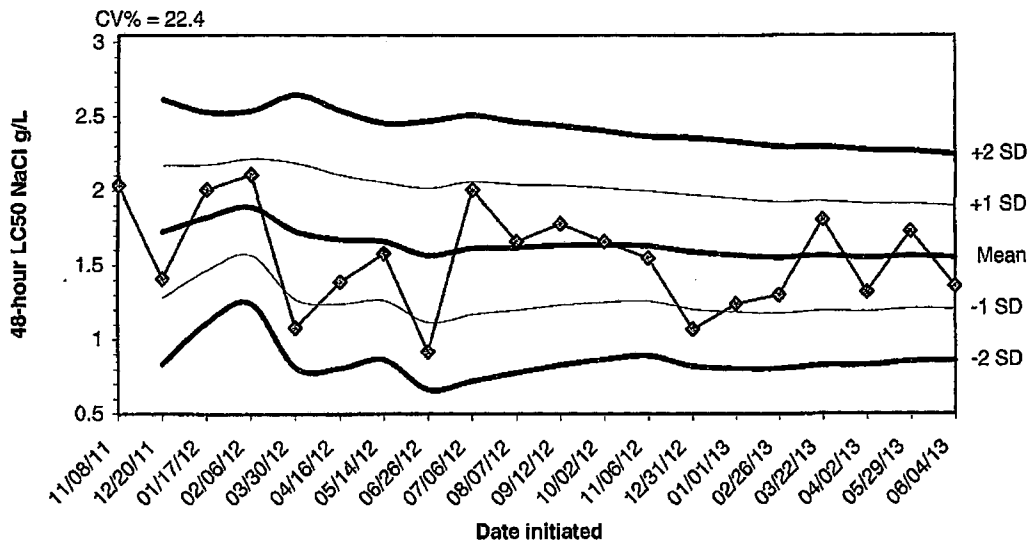
Conc-%	Mean	N-Mean	Transform: Arcsin Square Root					N	Rank Sum	1-Tailed Critical
			Mean	Min	Max	CV%				
D-Control	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5			
12	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5	27.50	16.00	
16	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5	27.50	16.00	
21	1.0000	1.0000	1.3931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

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05) Equality of variance cannot be confirmed	0.41613	0.927	-3.8705	19.8512

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

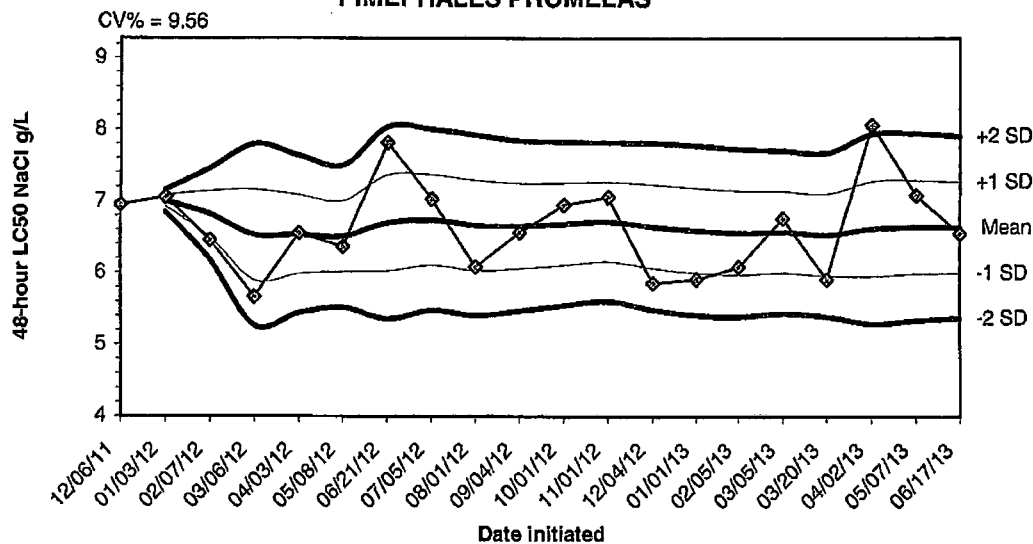
APPENDIX D
QUALITY ASSURANCE CHARTS

2013 48-hour Reference Toxicant Test Results Using *Daphnia pulex*



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
11/08/11	2.0400					
12/20/11	1.4100	1.7250	1.2795	0.8340	2.1705	2.6160
01/17/12	2.0100	1.8200	1.4646	1.1092	2.1754	2.5308
02/06/12	2.1100	1.8925	1.5681	1.2437	2.2169	2.5413
03/30/12	1.0800	1.7300	1.2707	0.8114	2.1893	2.6486
04/16/12	1.3900	1.6733	1.2397	0.8061	2.1070	2.5406
05/14/12	1.5800	1.6600	1.2626	0.8652	2.0574	2.4548
06/26/12	0.9200	1.5675	1.1160	0.6646	2.0190	2.4704
07/06/12	2.0100	1.6167	1.1693	0.7220	2.0640	2.5113
08/07/12	1.6600	1.6210	1.1990	0.7771	2.0430	2.4649
09/12/12	1.7800	1.6355	1.2323	0.8291	2.0386	2.4418
10/02/12	1.6600	1.6375	1.2530	0.8686	2.0220	2.4064
11/06/12	1.5500	1.6308	1.2619	0.8930	1.9997	2.3686
12/31/12	1.0700	1.5907	1.2059	0.8211	1.9755	2.3603
01/01/13	1.2400	1.5673	1.1856	0.8039	1.9490	2.3308
02/26/13	1.3000	1.5506	1.1758	0.8011	1.9254	2.3002
03/22/13	1.8100	1.5659	1.1976	0.8293	1.9342	2.3025
04/02/13	1.3200	1.5522	1.1903	0.8283	1.9142	2.2762
05/29/13	1.7300	1.5616	1.2075	0.8533	1.9157	2.2698
06/04/13	1.3600	1.5515	1.2039	0.8563	1.8991	2.2467

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



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
12/06/11	6.9500					
01/03/12	7.0600	7.0050	6.9272	6.8494	7.0828	7.1606
02/07/12	6.4600	6.8233	6.5039	6.1845	7.1428	7.4622
03/06/12	5.6700	6.5350	5.9021	5.2692	7.1679	7.8008
04/03/12	6.5600	6.5400	5.9918	5.4436	7.0882	7.6364
05/08/12	6.3700	6.5117	6.0164	5.5212	7.0069	7.5021
06/21/12	7.8200	6.6986	6.0286	5.3586	7.3686	8.0386
07/05/12	7.0300	6.7400	6.1087	5.4774	7.3713	8.0026
08/01/12	6.0900	6.6678	6.0388	5.4098	7.2968	7.9258
09/04/12	6.5700	6.6580	6.0642	5.4703	7.2518	7.8457
10/01/12	6.9500	6.6845	6.1143	5.5441	7.2547	7.8249
11/01/12	7.0600	6.7158	6.1615	5.6071	7.2702	7.8246
12/04/12	5.8600	6.6500	6.0686	5.4872	7.2314	7.8128
01/01/13	5.9200	6.5979	6.0062	5.4145	7.1896	7.7813
02/05/13	6.0900	6.5640	5.9789	5.3939	7.1491	7.7341
03/05/13	6.7700	6.5769	6.0093	5.4417	7.1444	7.7120
03/20/13	5.9200	6.5382	5.9661	5.3939	7.1104	7.6826
04/02/13	8.0700	6.6233	5.9612	5.2990	7.2855	7.9477
05/07/13	7.0900	6.6479	5.9955	5.3432	7.3003	7.9526
06/17/13	6.5600	6.6435	6.0082	5.3730	7.2788	7.9140

**APPENDIX E
AGENCY FORMS**

**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, Cotty, Williams**

**Sample Collected From: Date 6/17/13 Time 0800
To: Date 6/18/13 Time 0600**

**Test Begin Date 6/19/13 Time 1525
Test End Date 6/21/13 Time 1335**

Parameter	D.O.			Temperature			Alkalinity			Hardness			pH			
	Dilut./Time	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs
0		8.3	8.2	7.7	24.9	24.5	24.6	32.0			48.0			7.4	7.4	7.5
12		8.2	8.2	7.8	24.9	24.5	24.6							7.3	7.3	7.5
16		8.2	8.2	7.8	24.9	24.5	24.6							7.3	7.3	7.6
21		8.2	8.2	7.7	24.9	24.5	24.6							7.4	7.2	7.6
28		8.1	8.2	7.7	24.9	24.5	24.6							7.4	7.1	7.6
37		8.1	8.2	7.7	24.9	24.5	24.6	24.0	28.0		56.0	56.0		7.4	7.0	7.6

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

Acute Forms
Pimephales promelas Survival

Permittee: Camden Water Utilities

NPDES Permit Number: AR0022365/ AFIN 52-00073

Composite Collected

From: 6/17/13

To: 6/18/13

From: 6/18/13

To: 6/19/13

Test Initiated: 6/19/13

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	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	87.5
	C	100.0	100.0	100.0	100.0	100.0	100.0
	D	100.0	100.0	100.0	100.0	100.0	100.0
	E	100.0	100.0	100.0	100.0	100.0	100.0
	Mean	100.0	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 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
Pimephales promelas (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 6/17/13

Time 0800

To:

Date 6/18/13

Time 0600

Test Begin

Date 6/19/13

Time 1540

Test End

Date 6/21/13

Time 1340

Parameter	D.O.			Temperature			Alkalinity			Hardness			pH			
	Dilut./Time	0hrs.	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs
0		8.3	8.2	7.1	24.0	24.0	25.0	32.0			48.0			7.4	7.4	7.3
12		8.2	8.2	6.8	24.0	24.0	25.0							7.3	7.3	7.2
16		8.2	8.2	6.8	24.0	24.0	25.0							7.3	7.3	7.2
21		8.2	8.2	6.9	24.0	24.0	25.0							7.4	7.2	7.2
28		8.1	8.2	7.0	24.0	24.0	25.0							7.4	7.1	7.2
37		8.1	8.2	7.0	24.0	24.0	25.0	24.0	28.0		56.0	56.0		7.4	7.0	7.3

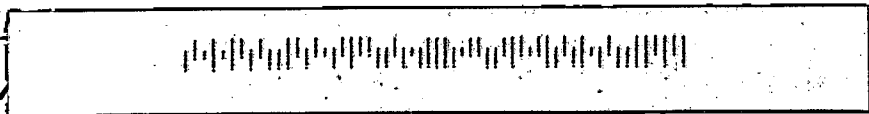
*This Form is to be submitted with each DMR.

Alkalinity and hardness to be reported as mg/l CaCO₃

CAMDEN WATER UTILITIES

P.O. BOX

CAMDEN



A. D. E. Q.
NPDES ENFORCEMENT DIV.
5301 NORTSHORE DR.
N. LITTLE ROCK AR 72118-5317