

Bio-Analytical Laboratories (BAL)
ADEQ#88-0630
Project X5270

Bio-Analytical Laboratories' Executive Summary

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

Project #: X5270

Outfall: Outfall 002 (treated municipal wastewater)

Permit #: AR0022365/ AFIN 52-00073

Contact: David Richardson

Test Dates: November 13 - 15, 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:

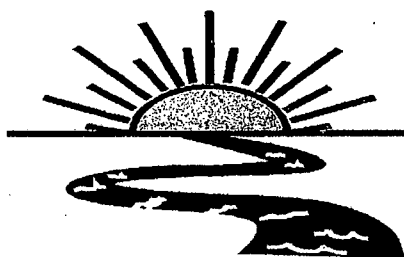
For *Daphnia pulex*:

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 - 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.



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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 X5270

**Test Dates: November 13 - 15, 2013
Report Date: December 18, 2013**

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

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BAL
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Project X5270

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Project X5270

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 LC₅₀, 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. 20th 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 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 November 12 and 13, 2013. 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 -0.3° 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 $25 \pm 1^{\circ}$ Celsius. The total residual chlorine level was measured with a Capital Controls^R amperometric titrator (SM 4500-CI D 1997) and recorded if present. The total ammonia level was measured using a HACH^R test strip. Dissolved oxygen (SM 4500-0 G 1997) and pH (SM 4500-H+ B 1997) measurements were measured on the control and each concentration at test initiation, at test renewal and at test termination. Conductivity (SM 2510 B 1997) measurements were also taken at test initiation and at each renewal. Alkalinity (SM 2320 B 1997) and hardness (SM 2340 C 1997) 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 $25 \pm 1^{\circ}$ Celsius. An AEMC^R data logger was used to monitor diurnal temperature throughout the testing period. Light cycle and intensity were recorded twice a month.

2.8 Data Analysis

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

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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	<i>Daphnia pulex</i>	Fathead minnow
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, with the *Daphnia pulex* result actually being greater than the trend. 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 November 12 and 13, 2013, were not found to be lethally toxic to the fathead minnow test organisms nor the *Daphnia pulex* test organisms in the 28.0 percent critical dilution after 48 hours of exposure ($p=.05$).

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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: X5270								
Address: P.O. Box J, Camden, AR 71711		Fax: (870) 836-5190		Chronic Ceriodaphnia	Chronic minnow	Acute minnow (fresh/marine)	Acute Daphnia species		Acute Mysid	Acute Ceriodaphnia	Fecal Coliform	Temp. upon arrival: Temperature upon arrival: -0.3°C				
Permit #: AR0022365/ AFIN 52-00073		Purchase Order:											Lab Control Number:	Tech: AT	Date: 11/13/13	Preservative: (below)
Sampler's Signature/Printed Name/Affiliation: <i>Mike Langley / Mike Langley</i>																
Date Start Date End	Time Start Time End	C	G					# and type of container					Sample Identification			
11-11-13 11-12-13	8:00 A 6:00 A		X	2 half gallons	002		X	X								
Relinquished by/Affiliation: <i>Mike Langley</i>				Date: 11-13-13	Time: 9:40	Received by/Affiliation: <i>L. B...</i>				Date: 11-13-13	Time: 0940					
Relinquished by/Affiliation:				Date:	Time:	Received by/Affiliation:				Date:	Time:					
Relinquished by/Affiliation: <i>L. B...</i>				Date: 11-13-13	Time: 3:00	Received by/Affiliation: <i>Ann H...</i>				Date: 11/13/13	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

Laboratory Use Only:

Company: Camden Water Utilities		Phone: (870) 836-4329		Analysis:				Project Number: X5270 Temp. upon arrival: Thermometer #: 29 Tech: FH Date: 11/13/13 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	Fecal Coliform		
Sampler's Signature/Printed Name/Affiliation:									
Date Start Date End	Time Start Time End	C	G	# and type of container	Sample Identification				
11-12-13 11-13-13	8:00 A 6:00 A	X		2 half gallons	002		C8200 / CE		
Relinquished by/Affiliation: Mike Sanjay				Date: 11-13-13	Time: 0940	Received by/Affiliation: [Signature]		Date: 11-13-13	Time: 0940
Relinquished by/Affiliation:				Date:	Time:	Received by/Affiliation:		Date:	Time:
Relinquished by/Affiliation: [Signature]				Date: 11-13-13	Time: 1300	Received by/Affiliation: Dennis Houston		Date: 11/13/13	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:									

**APPENDIX B
RAW DATA SHEETS**

BIO-ANALYTICAL LABORATORIES
ACUTE TOXICITY TEST WATER QUALITY DATA

Project# X5270

Client: CMDN/Camden Water Utilities

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

NPDES# AR0022365 Outfall 002

Technicians: EGB/AH/LC

Test initiated: Date 11/13/13 Time 1545
~~1550~~

Test terminated: Date 11/15/13 Time 1405

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
C8199	7.9/97.0%	No	40.01	NO	0.25	N/A	168.0	116.0	AH
C8200	9.7/112.1%	8.2/95.9%	40.01	↓	0.50	↓	160.0	116.0	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	3559	NA	NA	NA	NA	7.2	48.0	28.0	AH

Test Species Information

Test Species Info.	Species ID#	Species ID#	Species ID#	Species ID#
	<u>D. pulex</u>	<u>P. promelas</u>		
Age	<u>8d</u>	<u>8 days</u>		
Test Container Size	<u>30ml</u>	<u>250ml</u>		
Test volume	<u>25ml</u>	<u>200ml</u>		
Feeding: Type	<u>YCT. Algae</u>	<u>Artemia</u>		
Amount	<u>Fed 2 hrs prior to test initiation</u>			
Aeration?	<u>NA</u>	<u>NA</u>		
Amount				
Condition of survivors	<u>Good</u>	<u>Good</u>		

Comments:

LC

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

Project# X5270

Test started: Date 11/13/13 Time 1550

Client Camden

Test ended: Date 11/15/13 Time 1405

Sample Description 002

Test Species D. pulex ID# BAL/K18-N18

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

Time: Ohour 1550 24hour 1405 48hour 1405 72hour AM 96hour AM

Temperature (°C): Ohour 24.4 24hour 24.4 48hour 24.0 72hour AM 96hour AM

Test Dilution %	Replicate	Test Salinity	# Live Organisms					Dissolved Oxygen					pH					Conductivity						
			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96		
0	A	NA	8	8	8			8.3	8.1	8.4			7.4	7.2	7.5			179.4	206	179.1	198.8			
	B		8	8	8																			
	C		8	8	8																			
	D		8	8	8																			
	E		8	8	8																			
12	A		8	8	8			8.2	8.1	8.4			7.3	7.1	7.3			217.2	243	215	235			
	B		8	8	8																			
	C		8	8	8																			
	D		8	8	8																			
	E		8	8	8																			
Chemistry Tech prerenewal/postrenewal							AM	AM	AM			AM	AM	AM			AM	AM	AM					

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

Project# X5270

Test started: Date 1/13/13

Time 1550

Client Camden

Test ended: Date 1/15/13

Time 1405

Sample Description 002

Test Species D. pulex

ID# BAL/K18.N18

Technician:

0hour PH 24hour PH 48hour PH 72hour PH 96hour PH

Time:

0hour 1550 24hour 1445 48hour 1405 72hour PH 96hour PH

Temperature (°C):

0hour 21.4 24hour 21.4 48hour 24.0 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	
16	A	NA	8	8	8			8.1	8.0 8.2	8.4			7.0	7.1 7.2	7.2			225	252 233	238			
	B		8	8	8																		
	C		8	8	8																		
	D		8	8	8																		
	E		8	8	8																		
21	A		8	8	8			8.1	8.0 8.2	8.4			6.9	7.1 7.2	7.2			239	243 236	250			
	B		8	8	8																		
	C		8	8	8																		
	D		8	8	8																		
	E		8	8	8																		
Chemistry Tech prerenewal/postrenewal			PH	PH PH	PH			PH	PH PH	PH			PH	PH PH	PH			PH	PH PH	PH			

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

Project# X5270

Test started: Date 4/13/13

Time 1550

Client Camden

Test ended: Date 4/15/13

Time 1405

Sample Description 002

Test Species D. pulex

ID# BAL/K18-N18

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

Time: Ohour 1550 24hour 1445 48hour 1405 72hour PH 96hour PH

Temperature (°C): Ohour 24.4 24hour 24.4 48hour 24.0 72hour PH 96hour PH

Test Dilution %	Replicate	Test Salinity	# Live Organisms					Dissolved Oxygen					pH					Conductivity							
			0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96			
28	A	NA	8	8	8			8.1	7.9 8.2	8.3			6.8	7.1 7.1	7.2			261	253 256	275					
	B		8	8	8																				
	C		8	8	8																				
	D		8	8	8																				
	E		8	8	8																				
37	A		8	8	8			8.0	7.9 8.2	8.3			6.7	7.1 7.0	7.1			287	281 281	298					
	B		8	8	8																				
	C		8	8	8																				
	D		8	8	8																				
	E		8	8	8																				
Chemistry Tech prerenewal/postrenewal							PH	PH PH	PH			PH	PH PH	PH			PH	PH PH	PH						

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

Project# X5270

Test started: Date 11/21/13 Time 1545

Client Camden

Test ended: Date 11/21/13 Time 405

Sample Description 002

Test Species P. promelas ID# BA110513

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

Time: Ohour 1545 24hour 1440 48hour 1405 72hour 96hour

Temperature (°C): Ohour 24.7 24hour 24.4 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
0	A	NA	∞	∞	∞			8.3	7.8 8.3	8.1			7.4	7.3 7.4	7.3			179.4	204 179	182.5		
	B		∞	∞	∞																	
	C		∞	∞	∞																	
	D		∞	∞	∞																	
	E		∞	∞	∞																	
12	A		∞	∞	∞			8.2	7.8 8.2	8.1			7.3	7.2 7.2	7.1			217	210 217	215.0		
	B		∞	∞	∞																	
	C		∞	∞	∞																	
	D		∞	∞	∞																	
	E		∞	∞	∞																	
Chemistry Tech prerenewal/postrenewal								JC	AH JC	JC			JC	AH JC	JC			JC	AH JC	JC		

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

Project# X5270

Test started: Date 11/13/13 Time 1345

Client Camden

Test ended: Date 11/13/13 Time 1405

Sample Description 002

Test Species P. promelas ID# BAU 110513

Technician: Ohour LC 24hour PH 48hour LC 72hour LC 96hour LC
 Time: Ohour 1345 24hour 1400 48hour 1405 72hour LC 96hour LC
 Temperature (°C): Ohour 24.7 24hour 24.4 48hour 24.0 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
16	A	NA	8	8	8			8.1	7.8 8.2	8.0			7.0	7.1 7.2	7.1			225	226 227	228		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
21	A		8	8	8			8.1	7.8 8.2	8.1			6.9	7.1 7.1	7.1			239	240 241	242		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal							LC	PH	LC	LC	LC	PH	LC	LC	LC	LC	PH	LC	LC	LC	LC	LC

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

Project# X5270

Test started: Date 11/13/13

Time 1545

Client Camden

Test ended: Date 11/15/13

Time 1425

Sample Description 002

Test Species P. promelas

ID# BPJ 110013

Technician: 0hour LC 24hour AH 48hour LC 72hour LC 96hour LC
 Time: 0hour 1545 24hour 1440 48hour 1405 72hour LC 96hour LC
 Temperature (°C): 0hour 24.7 24hour 24.4 48hour 24.0 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
28	A	NA	8	8	8			8.1	7.1	8.0			6.8	7.0	7.0			261	285	256	265	
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
37	A		8	8	8			8.0	7.0	8.0			6.7	7.0	7.0			287	314	281	293	
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal							LC	AH	LC			LC	AH	LC			LC	AH	LC			

APPENDIX C
STATISTICAL ANALYSIS

Daphnid Acute Test-48 Hr Survival

Start Date: 11/13/2013 Test ID: X5270DP Sample ID: 002-AR0022365
 End Date: 11/15/2013 Lab ID: ADEQ880630 Sample Type: EFF1-POTW
 Sample Date: 11/13/2013 Protocol: EPAAW02-EPA/821/R-02-01 Test Species: DP-Daphnia pulex

Comments:

Conc-%	1	2	3	4	5
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000
12	1.0000	1.0000	1.0000	1.0000	1.0000
16	1.0000	1.0000	1.0000	1.0000	1.0000
21	1.0000	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				
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: 11/13/2013 Test ID: X5270PP Sample ID: 002-AR0022365
 End Date: 11/15/2013 Lab ID: ADEQ880630 Sample Type: EFF1-POTW
 Sample Date: 11/13/2013 Protocol: EPAAW02-EPA/821/R-02-01 Test Species: PP-Pimephales promelas

Comments:

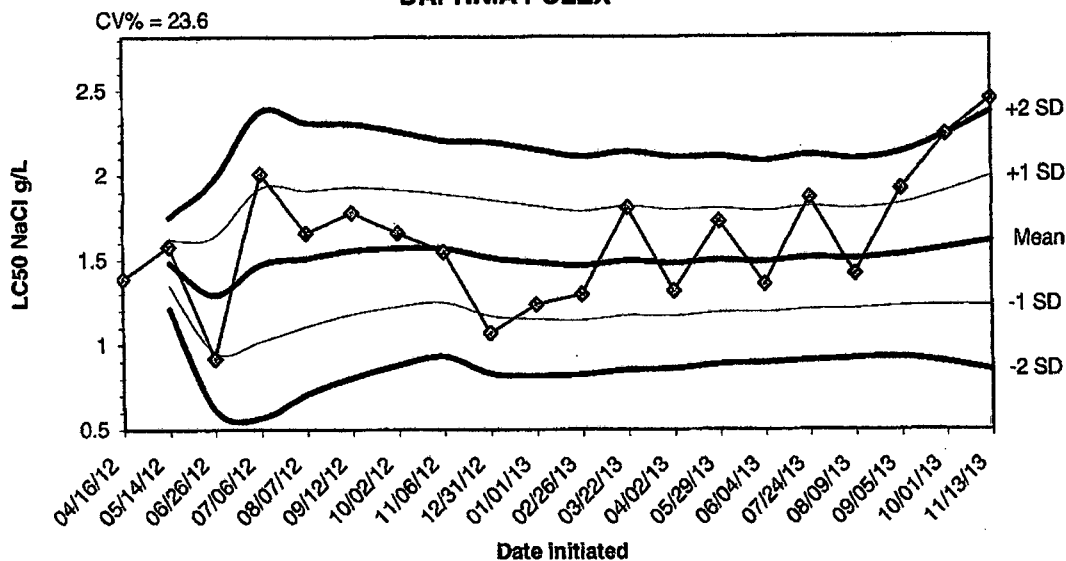
Conc-%	1	2	3	4	5
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000
12	1.0000	1.0000	1.0000	1.0000	1.0000
16	1.0000	1.0000	1.0000	1.0000	1.0000
21	1.0000	1.0000	1.0000	1.0000	1.0000
28	1.0000	1.0000	1.0000	1.0000	1.0000
37	1.0000	1.0000	1.0000	1.0000	1.0000

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				

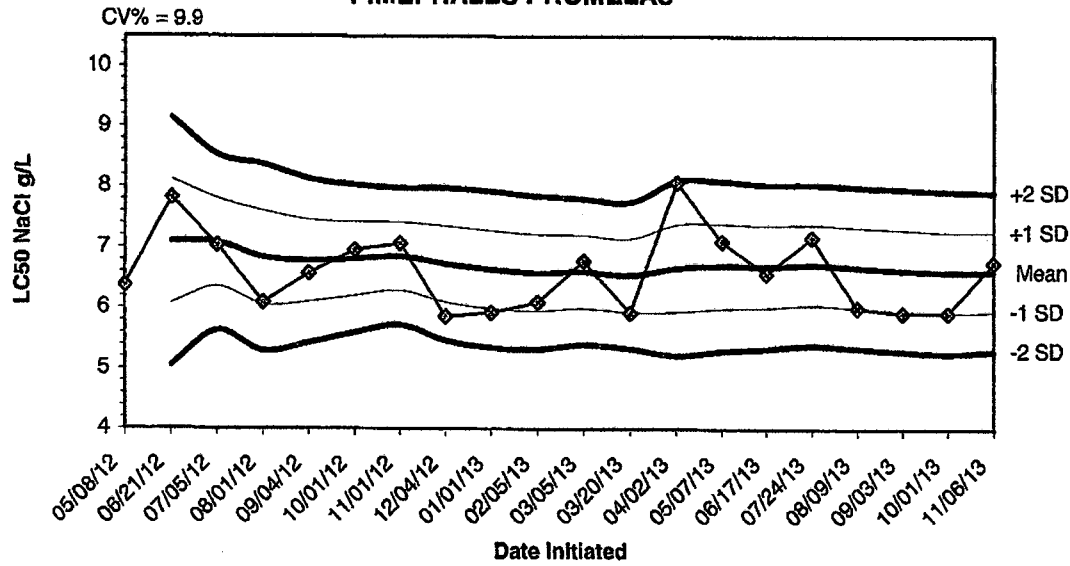
APPENDIX D
QUALITY ASSURANCE CHARTS

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



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
04/16/12	1.3900					
05/14/12	1.5800	1.4850	1.3506	1.2163	1.6194	1.7537
06/26/12	0.9200	1.2987	0.9569	0.6172	1.6364	1.9762
07/06/12	2.0100	1.4750	1.0232	0.5713	1.9268	2.3787
08/07/12	1.6600	1.5120	1.1120	0.7121	1.9120	2.3119
09/12/12	1.7800	1.5567	1.1826	0.8085	1.9308	2.3049
10/02/12	1.6600	1.5714	1.2277	0.8840	1.9152	2.2589
11/06/12	1.5500	1.5688	1.2504	0.9321	1.8871	2.2054
12/31/12	1.0700	1.5133	1.1723	0.8313	1.8544	2.1954
01/01/13	1.2400	1.4860	1.1531	0.8201	1.8189	2.1519
02/26/13	1.3000	1.4691	1.1483	0.8275	1.7899	2.1107
03/22/13	1.8100	1.4975	1.1762	0.8549	1.8188	2.1401
04/02/13	1.3200	1.4838	1.1723	0.8608	1.7954	2.1069
05/29/13	1.7300	1.5014	1.1950	0.8885	1.8079	2.1144
06/04/13	1.3600	1.4920	1.1944	0.8969	1.7896	2.0871
07/24/13	1.8700	1.5156	1.2130	0.9104	1.8182	2.1208
08/09/13	1.4200	1.5100	1.2161	0.9222	1.8039	2.0978
09/05/13	1.9200	1.5328	1.2317	0.9306	1.8339	2.1349
10/01/13	2.2400	1.5700	1.2354	0.9009	1.9046	2.2391
11/13/13	2.4500	1.6140	1.2335	0.8530	1.9945	2.3750

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



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
05/08/12	6.3700					
06/21/12	7.8200	7.0950	6.0697	5.0444	8.1203	9.1456
07/05/12	7.0300	7.0733	6.3474	5.6214	7.7993	8.5253
08/01/12	6.0900	6.8275	6.0574	5.2873	7.5976	8.3677
09/04/12	6.5700	6.7760	6.0992	5.4224	7.4528	8.1296
10/01/12	6.9500	6.8050	6.1955	5.5860	7.4145	8.0240
11/01/12	7.0600	6.8414	6.2767	5.7120	7.4061	7.9708
12/04/12	5.8600	6.7188	6.0913	5.4638	7.3462	7.9737
01/01/13	5.9200	6.6300	5.9855	5.3410	7.2745	7.9190
02/05/13	6.0900	6.5760	5.9448	5.3136	7.2072	7.8384
03/05/13	6.7700	6.5936	5.9920	5.3903	7.1953	7.7969
03/20/13	5.9200	6.5375	5.9318	5.3261	7.1432	7.7489
04/02/13	8.0700	6.6554	5.9364	5.2174	7.3744	8.0934
05/07/13	7.0900	6.6864	5.9859	5.2854	7.3869	8.0874
06/17/13	6.5600	6.6780	6.0022	5.3264	7.3538	8.0296
07/24/13	7.1600	6.7081	6.0442	5.3803	7.3720	8.0360
08/09/13	6.0000	6.6665	6.0011	5.3357	7.3319	7.9972
09/03/13	5.9200	6.6250	5.9559	5.2869	7.2941	7.9631
10/01/13	5.9200	6.5879	5.9179	5.2478	7.2579	7.9280
11/06/13	6.7500	6.5960	5.9428	5.2897	7.2492	7.9023

APPENDIX E
AGENCY FORMS

Acute Forms
Daphnia pulex Survival

Permittee: Camden Water Utilities

NPDES Permit Number: AR0022365/ AFIN 52-00073

Composite Collected From: 11/11/13 To: 11/12/13
 From: 11/12/13 To: 11/13/13

Test Initiated: 11/13/13

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

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

Contact: David Richardson

Analyst: Haughton

Sample Collected From: Date 11/11/13 Time 0800

To: Date 11/12/13 Time 0600

Test Begin Date 11/13/13 Time 1545

Test End Date 11/15/13 Time 1405

Parameter	D.O.			Temperature			Alkalinity			Hardness			pH			
	Dilut./Time	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs
0		8.3	8.3	8.4	24.4	24.4	24.0	28.0			48.0			7.4	7.4	7.5
12.0		8.2	8.2	8.4	24.4	24.4	24.0							7.3	7.2	7.3
16.0		8.1	8.2	8.4	24.4	24.4	24.0							7.0	7.2	7.2
21.0		8.1	8.2	8.4	24.4	24.4	24.0							6.9	7.1	7.2
28.0		8.1	8.2	8.3	24.4	24.4	24.0							6.8	7.1	7.2
37.0		8.0	8.2	8.3	24.4	24.4	24.0	16.0	16.0		68.0	60.0		6.7	7.0	7.1

*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: 11/11/13

To: 11/12/13

From: 11/12/13

To: 11/13/13

Test Initiated: 11/13/13

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	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_{50} below:

LC_{50} = >28.0% effluent

95 % confidence limits: N/A

Method of LC_{50} calculation: N/A

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

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

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

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

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

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

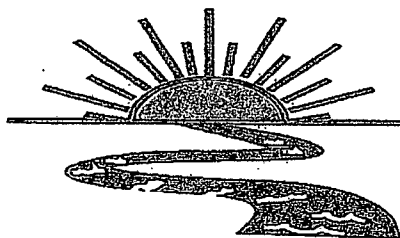
Contact: David Richardson
Analyst: Haughton, Cotty

Sample Collected From: Date 11/11/13 Time 0800
 To: Date 11/12/13 Time 0600
Test Begin Date 11/13/13 Time 1545
Test End Date 11/15/13 Time 1405

Parameter	D.O.			Temperature			Alkalinity			Hardness			pH			
	Dilut/Time	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs
0		8.3	8.3	8.1	24.7	24.4	24.0	28.0			48.0			7.4	7.4	7.3
12.0		8.2	8.2	8.1	24.7	24.4	24.0							7.3	7.2	7.1
16.0		8.1	8.2	8.0	24.7	24.4	24.0							7.0	7.2	7.1
21.0		8.1	8.2	8.1	24.7	24.4	24.0							6.9	7.1	7.1
28.0		8.1	8.2	8.0	24.7	24.4	24.0							6.8	7.1	7.0
37.0		8.0	8.2	8.0	24.7	24.4	24.0	16.0	16.0		68.0	60.0		6.7	7.0	7.0

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

APPENDIX F
REPORT QUALITY ASSURANCE FORM



Bio-Analytical Laboratories

3240 Spurgin Road
Post Office Box 527
Doyline, LA 71023

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

REPORT QUALITY ASSURANCE FORM

Client: Camden Water Utilities

Project#: X5270

Chain of Custody Documents Checked by: AH 12/2/13
Technician/Date

Raw Data Documents Checked by: AH 12/2/13
Technician/Date

Statistical Analysis Package Checked by: EGG 11/27/13
Quality Manager/Date

Quality Control Data Checked by: EGG 12/3/13
Quality Manager/Date

Report Checked by: EGG 12/19/13
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 H. Baupp
Quality Manager

12/19/13
Date

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

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



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