Bio-Analytical Laboratories (BAL)
ADEQ#88-0630
Project X5776

Bio-Analytical Laboratories' Executive Summary

Permittee: Camden Water Utilities
P.O. Drawer J
Camden, AR 71711
Project #: X5776
Outfall: Outfall 002 (treated municipal wastewater)
Permit #: AR0022365/ AFIN 52-00073
Contact: David Richardson
Test Dates: June 17 - 19, 2015
Test Type: 48-hour acute definitive toxicity test using *Daphnia pulex* (EPA 2021.0)
48-hour acute definitive toxicity test using *Pimephales promelas* (EPA 2000.0)
Results:

For *Daphnia pulex:*
1. If the NOEC for survival is less than the critical dilution (28.0%), enter a "1"; otherwise, enter a "0" for Parameter No. TEM3D- 0 **(Pass)**
2. Report the NOEC for survival, Parameter TOM3D - 37.0%.
3.Report the highest (critical dilution or control) Coefficient of Variation, Parameter TQM3D - 7.62%.

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 - 7.62%.

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

Bio-Analytical Laboratories

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THE RESULTS OF TWO 48-HOUR ACUTE DEFINITIVE TOXICITY TESTS FOR OUTFALL 002 AT

CAMDEN WATER UTILITIES
Camden, Arkansas

NPDES #AR0022365

EPA Methods 2000.0 and 2021.0

Project X5776

Test Dates: June 17 - 19, 2015
Report Date: June 30, 2015

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

Prepared by:
Ginger Briggs
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P.O. Box 527
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ADEQ #88-0630

BAL
ADEQ #88-0630
Project X5776

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BAL
ADEQ #88-0630
Project X5776

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), "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 four days 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 June 16 and 17, 2015. 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 0.2^0 Celsius.

2.6 Sample Preparation

Upon arrival, the samples were logged in, given an identification number and refrigerated unless needed. Prior to use, each sample was warmed to 25 ± 1^0 Celsius. The total residual chlorine level was measured with a Capital Controls^R amperometric titrator (SM 4500-Cl 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 ± 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.

2.8 Data Analysis

The NOEC and LC_{50} values 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 the 28.0 percent critical dilution in either test. The NOEC value for both tests was 37.0 percent effluent (p=.05). The 48-hour LC_{50} 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	
Test Organism	*Daphnia pulex*	Fathead minnow
Control	95.0	95.0
12.0	95.0	95.0
16.0	95.0	97.5
21.0	100.0	97.5
28.0	100.0	97.5
37.0	100.0	95.0

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

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4.0 Conclusions

The two composite samples of Outfall 002 collected from Camden Water Utilities, Camden, Arkansas, on June 16 and 17, 2015, 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

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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

Address: P.O. Box J, Camden, AR 71711
Fax: (870) 836-5190

Permit #: AR0022365/ AFIN 52-00073
Purchase Order:

Sampler's Signature/Printed Name/Affiliation: Annette Strickland (signature) Annette Strickland

Project Number: X5776
Temp. upon arrival: 0.2°C Therm 29 EGB 6/17/15
Preservative: (below)

Date Start / Date End	Time Start / Time End	C	G	# and type of container	Sample Identification	Chronic Ceriodaphnia	Chronic minnow	Acute minnow (fresh/marine)	Acute Daphnia species	Acute Mysid	Acute Ceriodaphnia	Fecal Coliform	Lab Control Number:	Preservative: (below)
6-15 / 6-16	800A / 8:00 A	X		2 half gallons	002			X	X				C11111	Ice

Relinquished by/Affiliation:	Date:	Time:	Received by/Affiliation:	Date:	Time:
Annette Strickland (signature)	6-17-15	10:15	(signature)	6-17-15	1015
(signature)	6-17-15	1320	(signature)	6/17/15	1320

Method of Shipment: ____ Lab ____ Bus ____ Fed Ex ____ DHL ____ UPS ____ Client ____ Other Tracking #________

Comments:

COC Rev. 3.0

Bio-Analytical Laboratories
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Post Office Box 527
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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:** X5776
Address: P.O. Box J, Camden, AR 71711				**Fax:** (870) 836-5190										**Temp. upon arrival:** 0.2°C Therm 29 EGB 6/17/15
Permit #: AR0022365/ AFIN 52-00073				**Purchase Order:**										
Sampler's Signature/Printed Name/Affiliation: [signature] Annette Strickland														
Date Start / Date End	Time Start / Time End	C	G	# and type of container	Sample Identification	Chronic Ceriodaphnia	Chronic minnow	Acute minnow(fresh/marine)	Acute Daphnia species	Acute Mysid	Acute Ceriodaphnia	Fecal Coliform	Lab Control Number:	Preservative: (below)
6-16 / 6-17	800 A / 800 A	X		2 half gallons	002			X	X				C11112	Ice

Relinquished by/Affiliation:	Date:	Time:	Received by/Affiliation:	Date:	Time:
[signature]	6-17-15	10:15	[signature]	6-17-15	1015
[signature]	6-17-15	1320	[signature] Briggs	6/17/15	1320

Method of Shipment: ____ Lab ____ Bus ____ Fed Ex ____ DHL ____ UPS ____ Client ____ Other Tracking #________

Comments:

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APPENDIX B
RAW DATA SHEETS

BIO-ANALYTICAL LABORATORIES
ACUTE TOXICITY TEST WATER QUALITY DATA

Project# X5776

Client: CMDN/Camden Water Utilities

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

NPDES#AR0022365 Outfall 002

Technicians: EGB/RC/CR 6/17/15 EGB

Test initiated: Date ~~6/17/15~~ Time 1625

Test terminated: Date 6/19/15 Time 1655

Dissolved Oxygen Meter: Model # YSI 55D Serial #06E2089 AV
pH Meter: Model #Orion 230A+ Serial #015253
Conductivity Meter: Model # Control Co. Serial #122175539
Amperometric Titrator: Model #Fischer-Porter Serial #92W445766

Sample Information

Sample ID#	Initial D.O. (mg/L and %)	Aerate? Minutes/ Final D.O(mg/L & %)	Total Residual Chlorine (mg/L)	Dechlorinated? Amount?	Ammonia (NH3) mg/L	Salinity	Hardness 37.0%	Alkalinity 37.0%	Tech
6/17/15 c11111	5.8/91.4%	Y/25/9.6/ ~~98.5%~~ 95%	<0.01	NO	3.0	N/A	48.0	36.0	CR
6/18/15 c11112	6.9/70.1%	Y/25/8.0/ 97.1%	<0.01	"	3.0		44.0	32.0	CR

* DO 6/17/15

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
CR 6/17/15 ~~Soft~~	~~3740~~								
Soft	3740	N/A	—	—	—	6.8	56.0	32.0	CR

Test Species Information

Test Species Info.	Species: D. pulex ID#:	Species: P. promelas ID#: BAL 06/3/15	Species: ID#:	Species: ID#:
Age	< 24 hrs	4 days		
Test Container Size	30 ml	300 ml		
Test volume	25 ml	250 ml		
Feeding: Type	2 hrs prior to	—		
Amount	test initiation	—		
Aeration?	N/A	N/A		
Amount				
Condition of survivors	good	good		

Comments:

ECB 6/19/15

Acutel Rev. 1.0

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

Project# X5776

Client Camdun 002

Test started: Date 6/17/15 Time 1630

Test ended: Date 6/19/15 Time 1640

Sample Description 002 Test Species D. pulex ID# L31-M31

Technician: Ohour BJ/EGB 24hour BJ/EGB 48hour EGB 72hour _____ 96hour _____

Time: Ohour 1640 24hour 1430 48hour 1640 72hour _____ 96hour _____

Temperature (°C): Ohour 26.1 24hour 25.0 48hour 25.2 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
		N/A																				
0 (50 ft)	A		8	8	8			7.8	7.9/8.2	7.9			7.4	7.3/7.4	7.5			162.8	181/166.7	198.0		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	7																	
	E		8	8	7																	
12.0	A		8	7	7			7.8	7.8/8.2	7.9			7.4	7.3/7.4	7.5			177.0	190.3/181.8	210.0		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	7	7																	
Chemistry Tech prerenewal/postrenewal								CR	BJ/BJ	EGB			CR	BJ/BJ	EGB			CR	BJ/BJ	EGB		

ACUTE2 Rev 1.0

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

Project# X5776

Client Camden 002

Sample Description 002

Test started: Date 6/17/15 Time 1630

Test ended: Date 6/19/15 Time 1640

Test Species D. pulex ID# L31M31

Technician: Ohour BJ/ECB 24hour BJ/ECB 48hour ECB 72hour _____ 96hour _____

Time: Ohour 1630 24hour 1430 48hour 1640 72hour _____ 96hour _____

Temperature (°C): Ohour 25.1° 24hour 25.0° 48hour 25.2 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
		N/A																				
16.0	A		8	8	8			7.7	7.6/8.1	7.8			7.3	7.3/7.4	7.5			191.4	204/187.5	206.0		
	B		8	8	8					7.8	ECB 6/19/15											
	C		8	8	8																	
	D		8	8	7																	
	E		8	8	7																	
21.0 ee 16.0 415	A		8	8	8			7.7	7.7/8.1	7.8			7.3	7.3/7.4	7.4			192.5	198/192.6	213.0		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal								CR	BJ/BJ	ECB			CR	BJ/BJ	ECB			CR	BJ/BJ	ECB		

ACUTE2 Rev 1.0

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

Project# X5776

Client Camden 002

Sample Description 002

Test started: Date 6/17/15 Time 1630

Test ended: Date 6/19/15 Time 1040

Test Species D. pulex ID# L3\M31

Technician:	Ohour BJ/EBP	24hour BJ/EBP	48hour EBP	72hour	96hour
Time:	Ohour 1630	24hour 1430	48hour 1040	72hour	96hour
Temperature (°C):	Ohour 25.1°	24hour 25.0°	48hour 25.2	72hour	96hour

Test Dilution %	Replicate	Test Salinity	# Live Organisms					Dissolved Oxygen					pH					Conductivity				
		N/A	0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
28.0	A		8	8	8			7.7	7.4/8.1	7.8			7.3	7.3/7.4	7.5			193.3	214/202	219.0		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
37.0	A		8	8	8			7.7	7.6/8.1	7.8			7.3	7.3/7.4	7.5			203	204/212	230		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal								CR	BJ/BJ	EBP			CR	BJ/BJ	EBP			CR	BJ/BJ	EBP		

ACUTE2 Rev 1.0

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

Project# X5776

Client Camden CO2

Test started: Date 6/17/15 Time 1625

Test ended: Date 6/19/15 Time 1655

Sample Description _____ Test Species P. promelas ID# BAL 061315

Technician: Ohour CR 24hour BJ/CR 48hour ECB 72hour _____ 96hour _____

Time: Ohour 1625 24hour 1510 48hour 1655 72hour _____ 96hour _____

Temperature (°C): Ohour 25.1 24hour 25.2 48hour 25.2 72hour _____ 96hour _____

Test Dilution %	Replicate	Test Salinity	# Live Organisms					Dissolved Oxygen					pH					* CR 6/17/15 Conductivity				
		N/A	0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
0 soft	A		8	8	8			7.8	7.8/8.2	7.8			7.4	7.4/7.4	7.5			102.8/167.8*	224/166.7	178.9		
	B		8	7	7																	
	C		8	8	8																	
	D		8	7	7																	
	E		8	8	8																	
12.0	A		8	7	7			7.8	7.9/8.2	7.7			7.4	7.5/7.4	7.3			177.0/181.4*	253/181.8	196.0		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	7	7																	
Chemistry Tech prerenewal/postrenewal								CR	BJ/CR	ECB			CR	BJ/CR	ECB			CR	BJ/CR	ECB		

ACUTE2 Rev 1.0

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

Project# X5776

Client Camden 002

Test started: Date 6/17/15 Time 1625

Test ended: Date 6/19/15 Time 1655

Sample Description _____ Test Species P. promelas ID# BAL061315

Technician:	Ohour CR	24hour BJ/EGB	48hour EGB	72hour _____	96hour _____
Time:	Ohour 1625	24hour 1510	48hour 1655	72hour _____	96hour _____
Temperature (°C):	Ohour 25.1	24hour 25.1	48hour 25.2	72hour _____	96hour _____

Test Dilution %	Replicate	Test Salinity	# Live Organisms					Dissolved Oxygen					pH					* CR 6/17/15 Conductivity				
		N/A	0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
160	A		8	7	7			7.7	7.9/8.1	7.6			7.3	7.5/7.4	7.3			191.4/196.8	217/181.5	196		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
21.0	A		8	7	7			7.7	7.9/8.1	7.7			7.3	7.5/7.4	7.3			192.5/192.6	216/192.6	202		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal								CR	BJ/CR	EGB			CR	BJ/CR	EGB			CR	BJ/CR	EGB		

ACUTE2 Rev 1.0

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

Project# X5776

Client Camden 002

Test started: Date 6/17/15 Time 1625

Test ended: Date 6/19/15 Time 1655

Sample Description _____ Test Species P. promelas ID# BAL061315

Technician: Ohour CR 24hour BJ/KB 48hour EQB 72hour _____ 96hour _____

Time: Ohour 1625 24hour 1515 48hour 1655 72hour _____ 96hour _____

Temperature (°C): Ohour 25.1 24hour 15.2 48hour 25.2 72hour _____ 96hour _____

Test Dilution %	Replicate	Test Salinity	# Live Organisms					Dissolved Oxygen					pH					Conductivity				
		N/A	0 hr	24	48	72	96	0	24	48	72	96	0	24	48	72	96	0	24	48	72	96
28.0	A		8	8	8			7.7	7.9/8.1	7.5			7.3	7.9/7.4	7.3			193.3	215/202	212		
	B		8	7	7																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
37.0	A		8	8	8			7.7	7.9/8.1	7.4			7.3	7.7/7.4	7.3			203	234/212	223/203		
	B		8	8	8																	
	C		8	8	8																	
	D		8	6	6																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal								CR	BJ/CR	EQB			CR	BJ/CR	EQB			CR	BJ/CR	EQB		

ACUTE2 Rev 1.0

* CR 6/18/15

APPENDIX C
STATISTICAL ANALYSIS

Daphnid Acute Test-48 Hr Survival

Start Date:	6/17/2015	Test ID:	X5776DP	Sample ID:	AR0022365
End Date:	6/19/2015	Lab ID:	ADEQ880630	Sample Type:	EFF1-POTW
Sample Date:	6/16/2015	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	0.8750	0.8750
12	0.8750	1.0000	1.0000	1.0000	0.8750
16	1.0000	1.0000	1.0000	0.8750	0.8750
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	0.9500	1.0000	1.3196	1.2094	1.3931	7.623	5		
12	0.9500	1.0000	1.3196	1.2094	1.3931	7.623	5	27.50	16.00
16	0.9500	1.0000	1.3196	1.2094	1.3931	7.623	5	27.50	16.00
21	1.0000	1.0526	1.3931	1.3931	1.3931	0.000	5	32.50	16.00
28	1.0000	1.0526	1.3931	1.3931	1.3931	0.000	5	32.50	16.00
37	1.0000	1.0526	1.3931	1.3931	1.3931	0.000	5	32.50	16.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.78409	0.927	-0.6082	-0.5626
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 ECB 10/9/15

Acute Fish Test-48 Hr Survival

Start Date:	6/17/2015	Test ID:	X5776PP	Sample ID:	AR0022365
End Date:	6/19/2015	Lab ID:	ADEQ880630	Sample Type:	EFF1-POTW
Sample Date:	6/16/2015	Protocol:	EPAA 91-EPA/600/4-90/027F	Test Species:	PP-Pimephales promelas
Comments:					

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

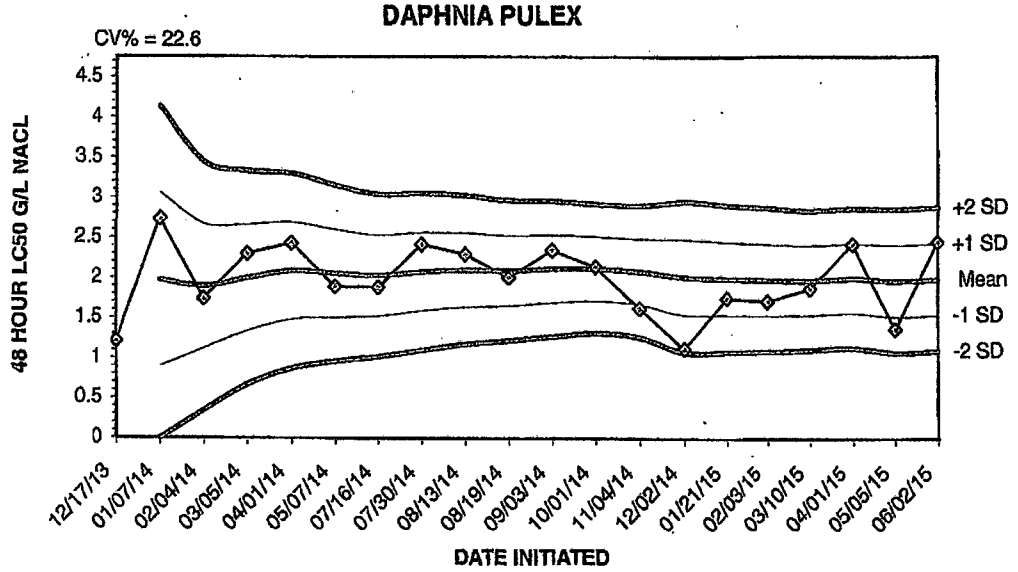
			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
D-Control	0.9500	1.0000	1.3196	1.2094	1.3931	7.623	5		
12	0.9500	1.0000	1.3196	1.2094	1.3931	7.623	5	27.50	16.00
16	0.9750	1.0263	1.3564	1.2094	1.3931	6.055	5	30.00	16.00
21	0.9750	1.0263	1.3564	1.2094	1.3931	6.055	5	30.00	16.00
28	0.9750	1.0263	1.3564	1.2094	1.3931	6.055	5	30.00	16.00
37	0.9500	1.0000	1.3239	1.0472	1.3931	11.684	5	29.00	16.00

Auxiliary Tests					Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)					0.73008	0.927	-1.4014	1.03771
Bartlett's Test indicates equal variances (p = 0.76)					2.5875	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								

Reviewed by: EVB 6/29/15

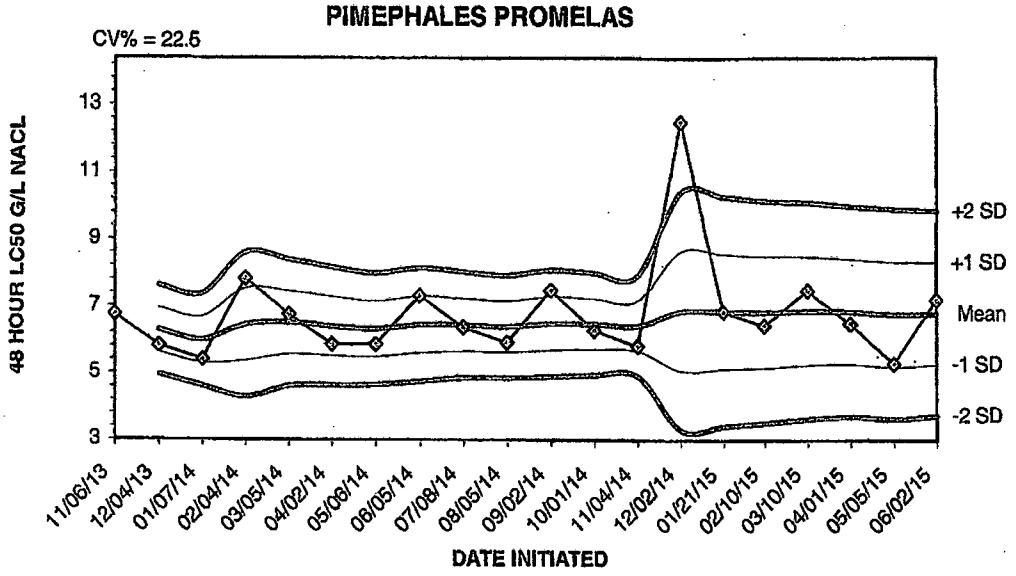
APPENDIX D
QUALITY ASSURANCE CHARTS

2015 48 HOUR ACUTE REFERENCE TOXICANT TEST RESULTS FOR DAPHNIA PULEX



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
12/17/13	1.2100					
01/07/14	2.7400	1.9750	0.8931	0.0000	3.0569	4.1387
02/04/14	1.7400	1.8967	1.1197	0.3428	2.6736	3.4505
03/05/14	2.3000	1.9975	1.3318	0.6662	2.6632	3.3288
04/01/14	2.4300	2.0840	1.4759	0.8679	2.6921	3.3001
05/07/14	1.8900	2.0517	1.5021	0.9525	2.6013	3.1509
07/16/14	1.8800	2.0271	1.5213	1.0154	2.5330	3.0389
07/30/14	2.4200	2.0763	1.5877	1.0992	2.5648	3.0533
08/13/14	2.3000	2.1011	1.6381	1.1751	2.5641	3.0271
08/19/14	2.0100	2.0920	1.6545	1.2170	2.5295	2.9670
09/03/14	2.3500	2.1155	1.6932	1.2709	2.5377	2.9600
10/01/14	2.1400	2.1175	1.7148	1.3121	2.5202	2.9229
11/04/14	1.6200	2.0792	1.6698	1.2603	2.4887	2.8982
12/02/14	1.1200	2.0107	1.5411	1.0716	2.4803	2.9499
01/21/15	1.7500	1.9933	1.5359	1.0784	2.4508	2.9083
02/03/15	1.7100	1.9756	1.5280	1.0804	2.4232	2.8708
03/10/15	1.8700	1.9694	1.5353	1.1011	2.4036	2.8377
04/01/15	2.4200	1.9944	1.5601	1.1257	2.4288	2.8632
05/05/15	1.3600	1.9611	1.5145	1.0680	2.4076	2.8541
06/02/15	2.4500	1.9855	1.5374	1.0892	2.4336	2.8818

2015 48 HOUR ACUTE REFERENCE TOXICANT TEST RESULTS FOR PIMEPHALES PROMELAS



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
11/06/13	6.7500					
12/04/13	5.8100	6.2800	5.6153	4.9506	6.9447	7.6094
01/07/14	5.4000	5.9867	5.2945	4.6024	6.6788	7.3709
02/04/14	7.8200	6.4450	5.3681	4.2913	7.5219	8.5987
03/05/14	6.7500	6.5060	5.5635	4.6210	7.4485	8.3910
04/02/14	5.8600	6.3983	5.5150	4.6317	7.2816	8.1649
05/06/14	5.8600	6.3214	5.4898	4.6582	7.1530	7.9847
06/05/14	7.3100	6.4450	5.5995	4.7539	7.2905	8.1361
07/08/14	6.3700	6.4367	5.6453	4.8540	7.2280	8.0193
08/05/14	5.9200	6.3850	5.6212	4.8575	7.1488	7.9125
09/02/14	7.4800	6.4845	5.6883	4.8921	7.2808	8.0770
10/01/14	6.2800	6.4675	5.7060	4.9446	7.2290	7.9904
11/04/14	5.8100	6.4169	5.6654	4.9139	7.1684	7.9200
12/02/14	12.5000	6.8514	5.0725	3.2936	8.6303	10.4092
01/21/15	6.8500	6.8513	5.1371	3.4230	8.5655	10.2797
02/10/15	6.4200	6.8244	5.1648	3.5052	8.4839	10.1435
03/10/15	7.4800	6.8629	5.2482	3.6335	8.4777	10.0924
04/01/15	6.4800	6.8417	5.2726	3.7035	8.4108	9.9799
05/05/15	5.2900	6.7600	5.1941	3.6282	8.3259	9.8918
06/02/15	7.2000	6.7820	5.2547	3.7274	8.3093	9.8366

APPENDIX E
AGENCY FORMS

Acute Forms
Daphnia pulex Survival

Permittee: Camden Water Utilities
NPDES Permit Number: AR0022365/ AFIN 52-00073
Composite Collected **From: 6/15/15** **To: 6/16/15**
From: 6/16/15 **To: 6/17/15**
Test Initiated: 6/17/15
Dilution Water Used: **Receiving Water** **Reconstituted Water**

Dilution Series Results - Percent Survival

TIME OF READING	REP	0	12.0	16.0	21.0	28.0	37.0
24-hour	A	100.0	87.5	100.0	100.0	100.0	100.0
	B	100.0	100.0	100.0	100.0	100.0	100.0
	C	100.0	100.0	100.0	100.0	100.0	100.0
	D	100.0	100.0	100.0	100.0	100.0	100.0
	E	100.0	87.5	100.0	100.0	100.0	100.0
48-hour	A	100.0	87.5	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	87.5	100.0	87.5	100.0	100.0	100.0
	E	87.5	87.5	87.5	100.0	100.0	100.0
	Mean	95.0	95.0	95.0	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.)½ LOW FLOW OR 2X CRITICAL DILUTION (N/A%) **YES** **NO**
2. Enter percent effluent corresponding to the LC_{50} below:
LC_{50} = >37.0% effluent
95 % confidence limits: N/A
Method of LC_{50} calculation: N/A
3. If you answered NO to 1.a) enter (P) otherwise enter (F): P
4. Enter response to item 3 on DMR Form, parameter TEM3D
5. If you answered NO to 1.b) enter (P) otherwise enter (F): N/A
6. Enter response to item 5 on DMR Form, parameter TFM3D

Biomonitoring
Daphnia 48 hour Acute Static Renewal
Chemical Parameters Chart*

Permittee: Camden Water Utilities
NPDES Number: AR0022365/ AFIN 52-00073
Contact: David Richardson
Analyst: Briggs
Sample Collected **From:** **Date 6/15/15** **Time 0800**
To: **Date 6/16/15** **Time 0800**
Test Begin **Date 6/17/15** **Time 1630**
Test End **Date 6/19/15** **Time 1640**

Parameter	D.O.			Temperature			Alkalinity			Hardness			pH		
Dilut./Time	0hrs.	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs
0	7.8	8.2	7.9	25.1	25.0	25.2	32.0			56.0			7.4	7.4	7.5
12.0	7.8	8.2	7.9	25.1	25.0	25.2							7.4	7.4	7.5
16.0	7.7	8.1	7.8	25.1	25.0	25.2							7.3	7.4	7.5
21.0	7.7	8.1	7.8	25.1	25.0	25.2							7.3	7.4	7.4
28.0	7.7	8.1	7.8	25.1	25.0	25.2							7.3	7.4	7.5
37.0	7.7	8.1	7.8	25.1	25.0	25.2	36.0	32.0		48.0	44.0		7.3	7.5	7.5

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

Acute Forms
Pimephales promelas Survival

Permittee: Camden Water Utilities
NPDES Permit Number: AR0022365/ AFIN 52-00073
Composite Collected **From: 6/15/15** **To: 6/16/15**
From: 6/16/15 **To: 6/17/15**
Test Initiated: 6/17/15
Dilution Water Used: **Receiving Water** **Reconstituted Water**

Dilution Series Results - Percent Survival

TIME OF READING	REP	0	12.0	16.0	21.0	28.0	37.0
24-hour	A	100.0	87.5	87.5	87.5	100.0	100.0
	B	87.5	100.0	100.0	100.0	87.5	100.0
	C	100.0	100.0	100.0	100.0	100.0	100.0
	D	87.5	100.0	100.0	100.0	100.0	75.0
	E	100.0	87.5	100.0	100.0	100.0	100.0
48-hour	A	100.0	87.5	87.5	87.5	100.0	100.0
	B	87.5	100.0	100.0	100.0	87.5	100.0
	C	100.0	100.0	100.0	100.0	100.0	100.0
	D	87.5	100.0	100.0	100.0	100.0	75.0
	E	100.0	87.5	100.0	100.0	100.0	100.0
	Mean	95.0	95.0	97.5	97.5	97.5	95.0

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.)½ LOW FLOW OR 2X CRITICAL DILUTION (N/A%) **YES** **NO**
2. Enter percent effluent corresponding to the LC_{50} below:
LC_{50} = >37.0% 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: Briggs, Rose
Sample Collected **From:** **Date 6/15/15** **Time 0800**
To: **Date 6/16/15** **Time 0800**
Test Begin **Date 6/17/15** **Time 1625**
Test End **Date 6/19/15** **Time 1655**

Parameter	D.O.			Temperature			Alkalinity			Hardness			pH		
Dilut./Time	0hrs.	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs	0hrs	24hrs	48hrs
0	7.8	8.2	7.8	25.1	25.2	25.2	32.0			56.0			7.4	7.4	7.3
12.0	7.8	8.2	7.7	25.1	25.2	25.2							7.4	7.4	7.3
16.0	7.7	8.1	7.6	25.1	25.2	25.2							7.3	7.4	7.3
21.0	7.7	8.1	7.7	25.1	25.2	25.2							7.3	7.4	7.3
28.0	7.7	8.1	7.5	25.1	25.2	25.2							7.3	7.4	7.3
37.0	7.7	8.1	7.4	25.1	25.2	25.2	36.0	32.0		48.0	44.0		7.3	7.4	7.3

*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

Client: Camden Water Utilities

Project#: X5776

Chain of Custody Documents Checked by: RC 6/22/15
Technician/Date

Raw Data Documents Checked by: RC 6/22/15
Technician/Date

Statistical Analysis Package Checked by: EGB 6/29/15
Quality Manager/Date

Quality Control Data Checked by: EGB 6/10/15
Quality Manager/Date

Report Checked by EGB 6/30/15
Quality Manager/Date

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

Erin G. Boggs, BS — 6/30/15
Quality Manager **Date**

Report Rev. 3.0

Camden Water Utilities
David Richardson, General Manager
P. O. Box J
Camden, AR 71711

2.52

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