4500 NORTH WEST AVE. • P.O. BOX 231 • EL DORADO, AR. 71731 • (870) 863-1400

EL DORADO
CHEMICAL COMPANY

January 20, 2016

Arkansas Department of Environmental Quality
Water Enforcement Branch
5301 Northshore Drive
North Little Rock, AR 72118-5317

RE: NPDES Permit AR0000752 Discharge Monitoring Report for period ending December 31, 2015.

Enclosed you will find the Discharge Monitoring Reports ending December 31, 2015.

If you have any questions regarding this report, please contact Edward L Pearson at (870) 863-1400.

Sincerely,

Edward L Pearson

Environmental Technician

Enclosures

NON-COMPLIANCE REPORT

Facility Name: El Dorado Chemical Company

Permit Number: AR0000752 **AFIN:** 70-00040

Month / Year: Dec-15

Type of Violation	Permit Limit	Date of Violation	Cause of Violation	Corrective Action or Other Narrative
Outfall 006 / Lead Monthly Average (14 ug/L)	3.8 ug/L Monthly Average	12/13/2015	Unknown	EDCC has applied pelletized lime in the area of outfall 006 in an effort to promote vegetative cover.
Outfall 006 / Lead Daily Max. (14 ug/L)	7.62 ug/L Daily Max.	12/13/2015	Unknown	EDCC has applied pelletized lime in the area of outfall 006 in an effort to promote vegetative cover.
Outfall 006/ Zinc Monthlly Average (380 ug/L)	115.62 ug/L Monthly Average	12/13/2015	Unknown	EDCC has applied pelletized lime in the area of outfall 006 in an effort to promote vegetative cover.
Outfall 006/ Zinc Daily Max. (380 ug/L)	231.99 ug/L Daily Max.	12/13/2015	Unknown	EDCC has applied pelletized lime in the area of outfall 006 in an effort to promote vegetative cover.
Outfall 007 / Lead Monthly Average (8.3 ug/L)	3.8 ug/L Monthly Average	12/13/2015	Unknown	EDCC has applied pelletized lime in the area of outfall 006 in an effort to promote vegetative cover.
Outfall 007 / Lead Daily Max. (8.3 ug/L)	7.62 ug/L Daily Max.	12/13/2015	Unknown	EDCC has applied pelletized lime in the area of outfall 006 in an effort to promote vegetative cover.

I CERTIFY THAT UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM WITH THE INFORMATION SUBMITTED HEREIN; AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION, INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 U.S.C 1001 AND 33 U.S.C. 1319. (Penalties under these statutes may include fines up to $10,000 and or maximum imprisonment of between 6 months and 5 years.)

Signature / Date 11/20/16

Bio-Analytical Laboratories (BAL)
ADEQ#88-0630
Project X5915

Bio-Analytical Laboratories' Executive Summary

Permittee: El Dorado Chemical Company
P.O. Box 231
El Dorado, AR 71731
Project #: X5915
Outfall: Outfall 006 (contaminated storm water)
Permit #: AR0000752/ AFIN #70-00040
Contact: Mr. Eddie Pearson
Test Dates: December 14 - 16, 2015
Test Type: 48-hour acute toxicity test using *Pimephales promelas* (EPA 2000.0).
48-hour acute toxicity test using *Daphnia pulex* (EPA 2021.0)

Results:

For *Pimephales promelas:*

1. If the NOEC for survival is less than the critical dilution (100.0%), enter a "1"; otherwise, enter a "0" for Parameter No. TEM6C- 0- **Pass.**
2. Report the NOEC for survival, Parameter TOM6C - 100.0%.
3.Report the highest (critical dilution or control) Coefficient of Variation, Parameter TQM6C - 6.06%.

For *Daphnia pulex:*

1. If the NOEC for survival is less than the critical dilution (100.0%), enter a "1"; otherwise, enter a "0" for Parameter No. TEM3D- 0- **Pass.**
2. Report the NOEC for survival, Parameter TOM3D -100.0%.
3.Report the highest (critical dilution or control) Coefficient of Variation, Parameter TQM3D - 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 data in this report is for monitoring purposes only and should not be reported on discharge monitoring reports.

Bio-Analytical Laboratories

3240 Spurgin Road
Post Office Box 527
Doyline, LA 71023

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

THE RESULTS OF TWO 48-HOUR ACUTE TOXICITY TESTS FOR OUTFALL 006 AT

EL DORADO CHEMICAL COMPANY
El Dorado, Arkansas

NPDES #AR0000752
AFIN #70-00040

EPA Methods 2000.0 and 2021.0

Project X5915

Test Dates: December 14 - 16, 2015
Report Date: December 18, 2015

Prepared for:
Mr. Eddie Pearson
El Dorado Chemical Company
P.O. Box 231
El Dorado, AR 71731

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

BAL
ADEQ #88-0630
Project X5915

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BAL
ADEQ #88-0630
Project X5915

1.0 Introduction

Bio-Analytical Laboratories (BAL), Doyline, Louisiana conducted two 48-hour acute toxicity tests for Outfall 006 at El Dorado Chemical Company, El Dorado, Arkansas. The test organisms used were the fathead minnow, *Pimephales promelas* and the cladoceran, *Daphnia pulex*. 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 procedures.

2.2 Test Organisms

The fathead minnows were raised in-house and were approximately five days old at test initiation. The minnows were acclimated to dilution water hardness prior to testing. The *Daphnia pulex* test organisms were also raised in-house at test temperature and were less than 24 hours old at test initiation. Forty-eight hour reference toxicant tests, using sodium chloride (NaCl), were conducted monthly in order to document organism sensitivity and demonstration of capability.

BAL
ADEQ #88-0630
Project X5915

2.3 Dilution Water

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

2.4 Test Concentrations

The test concentrations used in the tests were 100.0, 75.0, 56.0, 45.0, 32.0 and 22.0 percent effluent and a reconstituted water control. The critical dilution was defined as 100.0 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

One sample of Outfall 006 were collected by El Dorado Chemical personnel on December 13, 2015, at 1600 hours. Upon completion of collection, the sample was packed in ice and delivered to the laboratory by BAL personnel. The temperature upon arrival was 1.1^0 Celsius, respectively.

2.6 Sample Preparation

Upon arrival, the sample was logged in, given an identification number and refrigerated unless needed. Prior to use, the sample was warmed to 25 ± 1^0 Celsius. The total residual chlorine level (SM4500-Cl D 1997) was measured in milligrams/Liter (mg/) with a Capital Controls^R amperometric titrator and recorded if present. The total ammonia level was measured in mg/L using a HACH^R test strip. Dissolved oxygen (SM4500-O G 1997), pH (SM4500-H+ B 1997) and conductivity (SM2510-B 1997) measurements (in mg/L, standard units and umhos/cm, respectively) were taken on the control and each test concentration at test initiation, at each renewal and at test termination. Alkalinity (SM2320-B 1997) and hardness (SM2340-C 1997) levels were measured in mg/L as $CaCO_3$ 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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ADEQ #88-0630
Project X5915

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 critical dilution in either test after 48 hours of exposure (p=.05). The NOEC value for the fathead and *Daphnia pulex* tests was 100.0 percent effluent (p=.05). The 48-hour LC_{50} values could not be calculated in either test because greater than 50.0 percent survival occurred in each effluent concentration. See Appendix C- Statistical Analyses, for more information.

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

Percent Effluent	Percent Survival	
Test Organism	*Pimephales promelas*	*Daphnia pulex*
Control	100.0	100.0
22.0	92.5	100.0
32.0	97.5	100.0
45.0	100.0	100.0
56.0	97.5	100.0
75.0	97.5	100.0
100.0	97.5	100.0

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

BAL
ADEQ #88-0630
Project X5915

4.0 Conclusions

The sample of Outfall 006 collected from El Dorado Chemical Company, El Dorado, Arkansas, on December 13, 2015, were not found to be lethally toxic to the fathead minnow test organisms nor the *Daphnia pulex* test organisms in the 100.0 percent critical dilution after 48 hours of exposure (p=.05). The 48-hour LC_{50} values could not be calculated because greater than 50.0 percent survival occurred in the effluent dilutions (p=.05).

BAL
ADEQ #88-0630
Project X5915

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
3240 Spurgin Road
Post Office Box 527
Doyline, LA 71023
(318) 745-2772
1-800-259-1248
Fax: (318) 745-2773

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

Laboratory Use Only:

Company: El Dorado Chemical Company	Phone: (870) 863-1484	Analysis:							Lab Control Number:	Project Number: X5915
Address: 4500 Norwest Ave., El Dorado, AR 71731	Fax: (870) 863-7499	Chronic Ceriodaphnia	Chronic minnow	Acute minnow(fresh/marine)	Acute Daphnia species	Acute Mysid	Acute Ceriodaphnia	Fecal Coliform		Temp. upon arrival: 1.1°C Therm 9 EDB 12/14/15
Permit #: AR0000752/AFIN 70-00040	Purchase Order:									
Sampler's Signature/Printed Name/Affiliation: David Sartain / EDCC										

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)
12-13-15 / 12-13-15	1400 - 1600	✓		6 half gallons	006			X	X				C11786	ICE

	Date:	Time:		Date:	Time:
Relinquished by/Affiliation: David Sartain / EDCC	12/14/15	1000	Received by/Affiliation:	12/14/15	1100
Relinquished by/Affiliation:	Date:	Time:	Received by/Affiliation:	Date:	Time:
Relinquished by/Affiliation:	Date: 12/14/15	Time: 1305	Received by/Affiliation:	Date: 12/14/15	Time: 1305

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

Comments:

COC Rev. 3.0

APPENDIX B
RAW DATA SHEETS

BIO-ANALYTICAL LABORATORIES
ACUTE TOXICITY TEST WATER QUALITY DATA

Project# X5915

Client: EDCC/El Dorado Chemical Company

Address: 4500 Northwest Ave El Dorado AR 71731

NPDES#AR0000752 Outfall 006

Technicians: EGB/RC/CR

Test initiated: Date 12/14/15 Time 1618

Test terminated: Date 12/16/15 Time 1633

Dissolved Oxygen Meter: Model # YSI550A 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 100%	Alkalinity 100%	Tech
C11786	9.6/95.7%	Yes/8.2 98.4%	<0.01	NO	3.0	N/A	60.0	20.0	RC
	8.0/98.3%	No							

Dilution Water Information

Dilution Water	ID#	Initial D.O (mg/L & %)	Aerate? Minutes/D.O (mg/L & %)	Total Residual Chlorine (mg/L)	Ammonia (NH3) mg/L	pH	Hardness	Alkalinity	Tech
		N/A							
Soft H20	3804		N/A	N/A	N/A	7.4	48.0	36.0	EGB

Test Species Information

Test Species Info.	Species: D. pulex ID#: Ea-Fa	Species: P. promelas ID#: PAL/120915	Species: ID#:	Species: ID#:
Age	<24 hours	<5d		
Test Container Size	30ml	300ml		
Test volume	20ml	250ml		
Feeding: Type	YCT/Algae	Artemia		
Amount	before testinitiation			
Aeration?	N/A	N/A		
Amount	1	1		
Condition of survivors	Good RC 12/16/15	Good CR 12/16/15		

Comments:

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

Project# X5915

Client EDCC

Sample Description 006

Test started: Date 12/14/15 Time 1540

Test ended: Date 12/16/15 Time 1610

Test Species D. pulex ID# Ea-Fa

	Ohour	24hour	48hour	72hour	96hour
Technician:	EB	RC	RC		
Time:	1540	1645	1610		
Temperature (°C):	24.2	24.7	24.3		

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																				
0.50FT	A		8	8	8			8.2	7.7/8.3	8.1			7.4	7.3/7.2	7.4/7.6 RC 12/14			170.9	185.2/170.9	303		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
22.0	A		8	8	8			8.2	7.5/8.3	8.1			7.4	7.3/7.0	7.3			174.9	181.3/176.5	251		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal								RC	RC/RC	RC			RC	RC/RC	RC			RC	RC/RC	RC		

ACUTE2 Rev 1.0

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

Project# X5915

Client EDCC

Test started: Date 12/14/15 Time 1540

Test ended: Date 12/16/15 Time 1610

Sample Description 006

Test Species D. pulex ID# Ea Fa

Technician: Ohour EHB 24hour RC 48hour RC 72hour ____ 96hour ____

Time: Ohour 1540 24hour 1645 48hour 1610 72hour ____ 96hour ____

Temperature (°C): Ohour 24.2 24hour 24.7 48hour 24.3 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
32.0	A		8	8	8			8.2	7.4/8.2	8.0			7.4	7.2/6.9	7.2			175.8	187.3/175.4	251		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
45.0	A		8	8	8			8.2	7.4/8.2	8.0			7.4	7.1/6.9	7.1			178.1	189.9/177.8	252		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal								RC	RC/RC	RC			RC	RC/RC	RC			RC	RC/RC	RC		

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

Project# X5915

Client EDCC

Sample Description 006

Test started: Date 12/14/15 Time 1540

Test ended: Date 12/16/15 Time 1610

Test Species D. pulex ID# EaFa

Technician:	Ohour RB	24hour RC	48hour RC	72hour	96hour
Time:	Ohour 1540	24hour 1645	48hour 1610	72hour	96hour
Temperature (°C):	Ohour 24.2	24hour 24.7	48hour 24.3	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																				
56.0	A		8	8	8			8.2	7.4/8.1	8.0			7.4	7.1/6.8	7.0			180.2	197/176.5	254		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
75.0	A		8	8	8			8.2	7.3/8.2	8.0			7.4	7.0/6.7	7.0			184.3	320/184.5	260		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal								RC	RC/RC	RC			RC	RC/RC	RC			RC	RC/RC	RC		

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

Project# X5915

Client EDCC

Sample Description 906

Technician: Ohour EG 24hour RC 48hour RC 72hour _____ 96hour _____

Time: Ohour 1540 24hour 1645 48hour 1610 72hour _____ 96hour _____

Temperature (°C): Ohour 24.2 24hour 24.7 48hour 24.3 72hour _____ 96hour _____

Test started: Date 12/14/15 Time 1540

Test ended: Date 12/16/15 Time 1610

Test Species D. pulex ID# Ea F2

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
906		N/A																				
100.0	A		8	8	8			8.3	7.3/8.4	8.0			7.4	7.0/6.6	6.8			189.1	204/195.4	263		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
100.0 pH adj	A		8						/					/					/			
	B		8																			
	C		8																			
	D		8																			
	E		8																			
Chemistry Tech prerenewal/postrenewal								RC	RC/RC	RC			RC	RC/RC	RC			RC	RC/RC	RC		

X5915

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

Project# X5915

Client EDCC

Sample Description 006

Test started: Date 12/14/15 Time 1618

Test ended: Date 12/16/15 Time 1633

Test Species P. promelas ID# BAL120915

Technician:	Ohour CR	24hour RC	48hour CR	72hour _____ 96hour _____
Time:	Ohour 1618	24hour 1445	48hour 1633	72hour _____ 96hour _____
Temperature (°C):	Ohour 24.7	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
%		N/A																				
0.50FT	A		8	8	8			8.2	7.9/8.3	8.2			7.4	6.9/7.2	7.2			176.9	179.6/176.9	246		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
22.0	A		8	8	8			8.2	7.8/8.3	8.1			7.4	6.9/7.0	7.0			176.0	177.0/176.5	245		
	B		8	8	7																	
	C		8	8	7																	
	D		8	8	8																	
	E		8	7	7																	
Chemistry Tech prerenewal/postrenewal								RC	RC/RC	CR			RC	RC/RC	CR			RC	RC/RC	CR		

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

Project# X5915

Client EDCC

Sample Description 006

Test started: Date 12/14/15 Time 1618

Test ended: Date 12/16/15 Time 1633

Test Species P. promelas ID# BAL120915

Technician:	Ohour CR	24hour RC	48hour CR	72hour	96hour
Time:	Ohour 1618	24hour 1445	48hour 1633	72hour	96hour
Temperature (°C):	Ohour 24.7	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
%0		N/A																				
32.0	A		8	7	7			8.2	7.8/8.2	8.1			7.4	6.8/6.9	7.0			175.8	174.8/175.6	248		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
45.0	A		8	8	8			8.2	7.8/8.2	8.1			7.4	6.8/6.9	6.9			178.1	180.2/177.8	250		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal								RC	RC/RC	CR			RC	RC/RC	CR			RC	RC/RC	CR		

ACUTE2 Rev 1.0

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

Project# X5915

Client EDCC

Sample Description 006

Test started: Date 12/14/15 Time 1618

Test ended: Date 12/16/15 Time 1633

Test Species P. promelas ID# BAL12DEC15

	0hour	24hour	48hour	72hour	96hour
Technician:	CR	RC	CR		
Time:	1618	1445	1633		
Temperature (°C):	24.7	24.5	24.0		

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
56-0	A	N/A	8	8	8			8.2	7.1/8.1	8.0			7.4	6.8/6.8	6.9			180.2	190.8/179.2	253		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	7	7																	
75-0	A		8	8	8			8.2	7.1/8.2	8.0			7.4	6.8/6.7	6.8			184.3	195.0/184.5	257		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	7																	
Chemistry Tech prerenewal/postrenewal								RC	RC/RC	CR			RC	RC/RC	CR			RC	RC/RC	CR		

ACUTE2 Rev 1.0

X5915

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

Project# X5915

Client EDCC

Sample Description 006

Test started: Date 12/14/15 Time 1618

Test ended: Date 12/16/15 Time 1633

Test Species P.promelas ID# BAL120915

Technician:	Ohour CR	24hour RC	48hour CR	72hour	96hour
Time:	Ohour 1618	24hour 1445	48hour 1633	72hour	96hour
Temperature (°C):	Ohour 24.7	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 RC 12/13/15	24	48	72	96	0	24	48	72	96
0%		N/A																				
100.0	A		8	8	8			8.3	7.6/8.4	7.9			7.4	7.6/6.6	6.7			189.1	194/189	265		
	B		8	7	7																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
100.0 pH Adj	A		8						/					/					/			
	B		8																			
	C		8																			
	D		8																			
	E		8																			
Chemistry Tech prerenewal/postrenewal								RC	RC/RC	CR			RC	RC/RC	CR			RC	RC/RC	CR		

X5915

ACUTE2 Rev 1.0

APPENDIX C
STATISTICAL ANALYSES

Acute Fish Test-48 Hr Survival

Start Date:	12/14/2015	Test ID:	X5915PP	Sample ID:	AR0000752
End Date:	12/16/2015	Lab ID:	880630	Sample Type:	EFF2-Industrial
Sample Date:	12/14/2015	Protocol:	EPAAW02-EPA/821/R-02-01	Test Species:	PP-Pimephales promelas
Comments:					

Conc-%	1	2	3	4	5
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000
22	1.0000	0.8750	0.8750	1.0000	0.8750
32	0.8750	1.0000	1.0000	1.0000	1.0000
45	1.0000	1.0000	1.0000	1.0000	1.0000
56	1.0000	1.0000	1.0000	1.0000	0.8750
75	1.0000	1.0000	1.0000	1.0000	0.8750
100	1.0000	0.8750	1.0000	1.0000	1.0000

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
D-Control	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5		
22	0.9250	0.9250	1.2829	1.2094	1.3931	7.841	5	20.00	16.00
32	0.9750	0.9750	1.3564	1.2094	1.3931	6.055	5	25.00	16.00
45	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5	27.50	16.00
56	0.9750	0.9750	1.3564	1.2094	1.3931	6.055	5	25.00	16.00
75	0.9750	0.9750	1.3564	1.2094	1.3931	6.055	5	25.00	16.00
100	0.9750	0.9750	1.3564	1.2094	1.3931	6.055	5	25.00	16.00

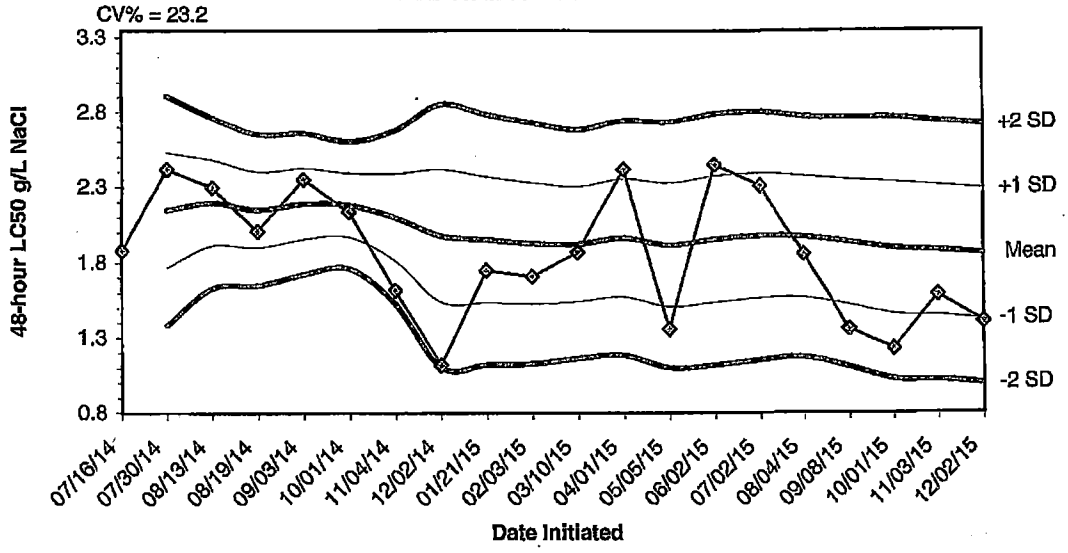
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.79176	0.934	-1.1257	0.90684
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	100	>100		1
Treatments vs D-Control				

Reviewed by: EGB 12/18/15

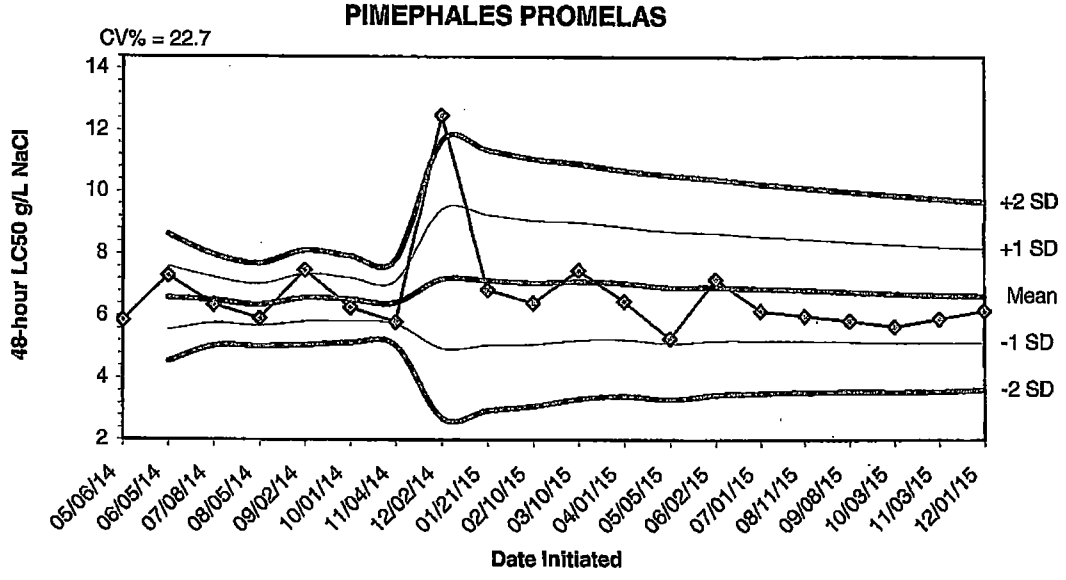
APPENDIX D
QUALITY ASSURANCE CHARTS

2015 48-HOUR ACUTE REFERENCE TOXICANT TEST RESULTS FOR DAPHNIA PULEX



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
07/16/14	1.8800					
07/30/14	2.4200	2.1500	1.7682	1.3863	2.5318	2.9137
08/13/14	2.3000	2.2000	1.9165	1.6329	2.4835	2.7671
08/19/14	2.0100	2.1525	1.9023	1.6520	2.4027	2.6530
09/03/14	2.3500	2.1920	1.9580	1.7239	2.4260	2.6601
10/01/14	2.1400	2.1833	1.9729	1.7625	2.3937	2.6041
11/04/14	1.6200	2.1029	1.8161	1.5294	2.3896	2.6764
12/02/14	1.1200	1.9800	1.5427	1.1054	2.4173	2.8546
01/21/15	1.7500	1.9544	1.5383	1.1221	2.3706	2.7868
02/03/15	1.7100	1.9300	1.5301	1.1302	2.3299	2.7298
03/10/15	1.8700	1.9245	1.5447	1.1649	2.3044	2.6842
04/01/15	2.4200	1.9658	1.5765	1.1871	2.3552	2.7446
05/05/15	1.3600	1.9192	1.5103	1.1014	2.3281	2.7371
06/02/15	2.4500	1.9571	1.5394	1.1218	2.3748	2.7925
07/02/15	2.3100	1.9807	1.5680	1.1553	2.3933	2.8060
08/04/15	1.8600	1.9731	1.5733	1.1735	2.3730	2.7728
09/08/15	1.3600	1.9371	1.5223	1.1076	2.3518	2.7665
10/01/15	1.2300	1.8978	1.4623	1.0268	2.3333	2.7687
11/03/15	1.5900	1.8816	1.4525	1.0235	2.3106	2.7397
12/02/15	1.4100	1.8580	1.4273	0.9966	2.2887	2.7194

2015 48-HOUR ACUTE REFERENCE TOXICANT TEST RESULTS FOR PIMEPHALES PROMELAS



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
05/06/14	5.8600					
06/05/14	7.3100	6.5850	5.5597	4.5344	7.6103	8.6356
07/08/14	6.3700	6.5133	5.7778	5.0422	7.2489	7.9844
08/05/14	5.9200	6.3650	5.6951	5.0253	7.0349	7.7047
09/02/14	7.4800	6.5880	5.8230	5.0581	7.3530	8.1179
10/01/14	6.2800	6.5367	5.8410	5.1453	7.2323	7.9280
11/04/14	5.8100	6.4329	5.7410	5.0491	7.1248	7.8167
12/02/14	12.5000	7.1913	4.9526	2.7139	9.4299	11.6686
01/21/15	6.8500	7.1533	5.0562	2.9590	9.2505	11.3477
02/10/15	6.4200	7.0800	5.0892	3.0984	9.0708	11.0616
03/10/15	7.4800	7.1164	5.2239	3.3314	9.0088	10.9013
04/01/15	6.4800	7.0633	5.2496	3.4359	8.8771	10.6908
05/05/15	5.2900	6.9269	5.1221	3.3173	8.7317	10.5366
06/02/15	7.2000	6.9464	5.2109	3.4753	8.6820	10.4175
07/01/15	6.1800	6.8953	5.2113	3.5272	8.5794	10.2635
08/11/15	6.0000	6.8394	5.1971	3.5548	8.4817	10.1240
09/08/15	5.8600	6.7818	5.1740	3.5662	8.3896	9.9974
10/03/15	5.6700	6.7200	5.1384	3.5567	8.3016	9.8833
11/03/15	5.9200	6.6779	5.1299	3.5819	8.2259	9.7739
12/01/15	6.1800	6.6530	5.1422	3.6314	8.1638	9.6746

APPENDIX E
AGENCY FORMS

Acute Forms
Daphnia pulex Survival

Permittee: El Dorado Chemical - Outfall 006
NPDES Permit Number: AR0000752/ AFIN 70-00040
Composite Collected **From: 12/13/15** **To: 12/13/15**
From: **To:**
Test Initiated: 12/14/15
Dilution Water Used: **Receiving Water** **X Reconstituted Water**

Dilution Series Results - Percent Survival

TIME OF READING	REP	0	22.0	32.0	45.0	56.0	75.0	100.0
24-hour	A	100.0	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	100.0
	C	100.0	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	100.0
	E	100.0	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	100.0
	B	100.0	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	100.0
	D	100.0	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	100.0
	Mean	100.0	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 (100.0%) **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} = N/A% effluent
95 % confidence limits:
Method of LC_{50} calculation:
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 pulex 48 hour Acute Static Renewal
Chemical Parameters Chart*

Permittee: El Dorado Chemical - Outfall 006
NPDES Number: AR0000752/ AFIN 70-00040
Contact: Eddie Pearson
Analyst: Briggs, Callahan
Sample Collected **From:** **Date 12/13/15** **Time 1400**
To: **Date 12/13/15** **Time 1600**
Test Begin **Date 12/14/15** **Time 1540**
Test End **Date 12/16/15** **Time 1610**

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	8.2	8.3	8.1	24.2	24.7	24.3	36.0			48.0			7.4	7.2	7.4
22.0	8.2	8.3	8.1	24.2	24.7	24.3							7.4	7.0	7.3
32.0	8.2	8.2	8.0	24.2	24.7	24.3							7.4	6.9	7.2
45.0	8.2	8.2	8.0	24.2	24.7	24.3							7.4	6.9	7.1
56.0	8.2	8.1	8.0	24.2	24.7	24.3							7.4	6.8	7.0
75.0	8.2	8.2	8.0	24.2	24.7	24.3							7.4	6.7	7.0
100.0	8.3	8.4	8.0	24.2	24.7	24.3	20.0			60.0			7.4	6.6	6.8

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

Acute Forms
Pimephales promelas (Fathead minnow) Survival

Permittee: El Dorado Chemical - Outfall 006
NPDES Permit Number: AR0000752/ AFIN 70-00040
Composite Collected **From: 12/13/15** **To: 12/13/15**
From: **To:**
Test Initiated: 12/14/15
Dilution Water Used: **Receiving Water** **X Reconstituted Water**

Dilution Series Results - Percent Survival

TIME OF READING	REP	0	22.0	32.0	45.0	56.0	75.0	100.0
24-hour	A	100.0	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	87.5
	C	100.0	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	100.0
	E	100.0	87.5	100.0	100.0	87.5	100.0	100.0
48-hour	A	100.0	100.0	87.5	100.0	100.0	100.0	100.0
	B	100.0	87.5	100.0	100.0	100.0	100.0	87.5
	C	100.0	87.5	100.0	100.0	100.0	100.0	100.0
	D	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	E	100.0	87.5	100.0	100.0	87.5	87.5	100.0
	Mean	100.0	92.5	97.5	100.0	97.5	97.5	97.5

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 (100.0%) **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} = N/A% effluent
95 % confidence limits:
Method of LC_{50} calculation:
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: El Dorado Chemical - Outfall 006
NPDES Number: AR0000752/ AFIN 70-00040
Contact: Eddie Pearson
Analyst: Callahan, Rose
Sample Collected **From:** **Date 12/13/15** **Time 1400**
To: **Date 12/13/15** **Time 1600**
Test Begin **Date 12/14/15** **Time 1618**
Test End **Date 12/16/15** **Time 1633**

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	8.2	8.3	8.2	24.7	24.5	24.0	36.0			48.0			7.4	7.2	7.2
22.0	8.2	8.3	8.1	24.7	24.5	24.0							7.4	7.0	7.0
32.0	8.2	8.2	8.1	24.7	24.5	24.0							7.4	6.9	7.0
45.0	8.2	8.2	8.1	24.7	24.5	24.0							7.4	6.9	6.9
56.0	8.2	8.1	8.0	24.7	24.5	24.0							7.4	6.8	6.9
75.0	8.2	8.2	8.0	24.7	24.5	24.0							7.4	6.7	6.8
100.0	8.3	8.4	7.9	24.7	24.5	24.0	20.0			60.0			7.4	6.6	6.7

*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: El Dorado Chemical Company

Project#: X5915

Chain of Custody Documents Checked by: RC 12/18/15
Technician/Date

Raw Data Documents Checked by: RC 12/18/15
Technician/Date

Statistical Analysis Package Checked by: EGB 12/7/15
Quality Manager/Date

Quality Control Data Checked by: EGB 12/18/15
Quality Manager/Date

Report Checked by: EGB 12/21/15
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.

Ernest L. Boggs, BS
Quality Manager

12/21/15
Date

Report Rev. 3.0

Bio-Analytical Laboratories (BAL)
ADEQ#88-0630
Project X5916

Bio-Analytical Laboratories' Executive Summary

Permittee: El Dorado Chemical Company
P.O. Box 231
El Dorado, AR 71731
Project #: X5916
Outfall: Outfall 007 (contaminated storm water)
Permit #: AR0000752/ AFIN #70-00040
Contact: Mr. Eddie Pearson
Test Dates: December 14 - 16, 2015
Test Type: 48-hour acute toxicity test using *Pimephales promelas* (EPA 2000.0).
48-hour acute toxicity test using *Daphnia pulex* (EPA 2021.0)

Results:

For *Pimephales promelas:*

1. If the NOEC for survival is less than the critical dilution (100.0%), enter a "1"; otherwise, enter a "0" for Parameter No. TEM6C- 0- **Pass.**
2. Report the NOEC for survival, Parameter TOM6C - 100.0%.
3.Report the highest (critical dilution or control) Coefficient of Variation, Parameter TQM6C - 6.06%.

For *Daphnia pulex:*

1. If the NOEC for survival is less than the critical dilution (100.0%), enter a "1"; otherwise, enter a "0" for Parameter No. TEM3D- 0- **Pass.**
2. Report the NOEC for survival, Parameter TOM3D -100.0%.
3.Report the highest (critical dilution or control) Coefficient of Variation, Parameter TQM3D - 19.10%.

This report contains a total of 33 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 data in this report is for monitoring purposes only and should not be reported on discharge monitoring reports.

Bio-Analytical Laboratories

3240 Spurgin Road
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Doyline, LA 71023

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

THE RESULTS OF TWO 48-HOUR ACUTE TOXICITY TESTS FOR OUTFALL 007 AT

EL DORADO CHEMICAL COMPANY
El Dorado, Arkansas

NPDES #AR0000752
AFIN #70-00040

EPA Methods 2000.0 and 2021.0

Project X5916

Test Dates: December 14 - 16, 2015
Report Date: December 18, 2015

Prepared for:
Mr. Eddie Pearson
El Dorado Chemical Company
P.O. Box 231
El Dorado, AR 71731

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

BAL
ADEQ #88-0630
Project X5916

TABLE OF CONTENTS

BAL
ADEQ #88-0630
Project X5916

1.0 Introduction

Bio-Analytical Laboratories (BAL), Doyline, Louisiana conducted two 48-hour acute toxicity tests for Outfall 007 at El Dorado Chemical Company, El Dorado, Arkansas. The test organisms used were the fathead minnow, *Pimephales promelas* and the cladoceran, *Daphnia pulex*. 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 procedures.

2.2 Test Organisms

The fathead minnows were raised in-house and were approximately five days old at test initiation. The minnows were acclimated to dilution water hardness prior to testing. The *Daphnia pulex* test organisms were also raised in-house at test temperature and were less than 24 hours old at test initiation. Forty-eight hour reference toxicant tests, using sodium chloride (NaCl), were conducted monthly in order to document organism sensitivity and demonstration of capability.

BAL
ADEQ #88-0630
Project X5916

2.3 Dilution Water

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

2.4 Test Concentrations

The test concentrations used in the tests were 100.0, 75.0, 56.0, 50.0, 45.0 and 32.0 percent effluent and a reconstituted water control. The critical dilution was defined as 100.0 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

One sample of Outfall 007 were collected by El Dorado Chemical personnel on December 13, 2015, at 1810 hours. Upon completion of collection, the sample was packed in ice and delivered to the laboratory by BAL personnel. The temperature upon arrival was 0.2^0 Celsius, respectively.

2.6 Sample Preparation

Upon arrival, the sample was logged in, given an identification number and refrigerated unless needed. Prior to use, the sample was warmed to 25 ± 1^0 Celsius. The total residual chlorine level (SM4500-Cl D 1997) was measured in milligrams/Liter (mg/) with a Capital Controls^R amperometric titrator and recorded if present. The total ammonia level was measured in mg/L using a HACH^R test strip. Dissolved oxygen (SM4500-O G 1997), pH (SM4500-H+ B 1997) and conductivity (SM2510-B 1997) measurements (in mg/L, standard units and umhos/cm, respectively) were taken on the control and each test concentration at test initiation, at each renewal and at test termination. Alkalinity (SM2320-B 1997) and hardness (SM2340-C 1997) levels were measured in mg/L as $CaCO_3$ 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.

BAL
ADEQ #88-0630
Project X5916

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 critical dilution in either test after 48 hours of exposure (p=.05). The NOEC value for the fathead and *Daphnia pulex* tests was 100.0 percent effluent (p=.05). The 48-hour LC_{50} values could not be calculated in either test because greater than 50.0 percent survival occurred in each effluent concentration. See Appendix C- Statistical Analyses, for more information.

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

Percent Effluent	Percent Survival	
Test Organism	*Pimephales promelas*	*Daphnia pulex*
Control	97.5	100.0
32.0	100.0	100.0
45.0	97.5	100.0
50.0	97.5	95.0
56.0	100.0	85.0
75.0	100.0	92.5
100.0	97.5	82.5

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

BAL
ADEQ #88-0630
Project X5916

4.0 Conclusions

The sample of Outfall 007 collected from El Dorado Chemical Company, El Dorado, Arkansas, on December 13, 2015, were not found to be lethally toxic to the fathead minnow test organisms nor the *Daphnia pulex* test organisms in the 100.0 percent critical dilution after 48 hours of exposure (p=.05). The 48-hour LC_{50} values could not be calculated because greater than 50.0 percent survival occurred in the effluent dilutions (p=.05).

BAL
ADEQ #88-0630
Project X5916

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

X5916
Page 10 of 33

Bio-Analytical Laboratories
3240 Spurgin Road
Post Office Box 627
Doyline, LA 71023
(318) 746-2772
1-800-259-1246
Fax: (318) 746-2773

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

Laboratory Use Only:

Company: El Dorado Chemical Company
Phone: (870) 863-1484
Address: 4500 Norwest Ave., El Dorado, AR 71731
Fax: (870) 863-7499
Permit #: AR0000752/AFIN 70-00040
Purchase Order:
Sampler's Signature/Printed Name/Affiliation: D. L. Sartain / David Sartain / EDCC

Analysis:

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:
12-13-15 / 12-13-15	1410 - 1810	✓		6 half gallons	007			X	X				C11787

Project Number: X5916
Temp. upon arrival: 0.2°C Therm 29 EAB 12/14/15
Preservative: (below) ICE

Relinquished by/Affiliation:	Date:	Time:	Received by/Affiliation:	Date:	Time:
D. L. Sartain / EDCC	12-14-15	1000		12-14-15	1100
Relinquished by/Affiliation:	Date:	Time:	Received by/Affiliation:	Date:	Time:
Relinquished by/Affiliation:	Date:	Time:	Received by/Affiliation:	Date:	Time:
	12-14-15	1305		12/14/15	1305

Method of Shipment: ___ Lab ___ Bus ___ Fed Ex ___ DHL ___ UPS ___ Client ___ Other **Tracking #**_____
Comments:

COC Rev. 3.0

APPENDIX B
RAW DATA SHEETS

BIO-ANALYTICAL LABORATORIES
ACUTE TOXICITY TEST WATER QUALITY DATA

Project# X5916

Client: EDCC/El Dorado Chemical Company

Address: 4500 Northwest Ave El Dorado AR 71731

NPDES#AR0000752 Outfall 007

Technicians: EGB/RC/CR

Test initiated: Date 12/14/15 Time 1650

Test terminated: Date 12/16/15 Time 1655

Dissolved Oxygen Meter: Model # YSI550A Serial #06E2089 AV
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
C11787	9.9/110.1%	Y/6/8.2/99.6%	<0.01	NO	0.25	N/A	80.0	20.0	RC
|	8.8/107.7%	Y/6/8.0/98.5%	|	|	|	|	|	|	RC
|			|	|	|	|	|	|	

Dilution Water Information

Dilution Water	ID#	Initial D.O (mg/L & %)	Aerate? Minutes/D.O (mg/L & %)	Total Residual Chlorine (mg/L)	Ammonia (NH3) mg/L	pH	Hardness	Alkalinity	Tech
Soft H2O	3804	N/A	N/A	N/A	N/A	7.4	48.0	36.0	EGB
	|	|	|	|	|		|	|	

Test Species Information

Test Species Info.	Species: D. pulex ID#: E2-F2	Species: P. promelas ID#: BAL/120915	Species: ID#:	Species: ID#:
Age	<24 hours	5d		
Test Container Size	30ml	300ml		
Test volume	20ml	250ml		
Feeding: Type	YCT/Algae	Artemia		
Amount	before initiation	2 hrs prior to Test initiation		
~~Aeration?~~	N/A			
Amount	|	N/A		
Condition of survivors	Good RC 12/16/15	Good CR 12/16/15		

Comments:

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

Project# X5916

Client EDCC

Sample Description 007

Test started: Date 12/14/15 Time 1540

Test ended: Date 12/16/15 Time 1620

Test Species D. pulex ID# Ea Fa

Technician:	Ohour BB	24hour RC	48hour RC	72hour	96hour	
Time:	Ohour 1540	24hour 1110	48hour 1620	72hour	96hour	
Temperature (°C):	Ohour 24.2	24hour 24.7	48hour 24.3	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
0 SOFT	A		8	8	8			8.2	7.7/8.3	8.0			7.4	7.3/7.2	7.3			173	202/170	260		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
RC 12/1/15	E		8	8	8																	
32.0	A		8	8	8			8.2	7.7/8.2	8.0			7.1	7.1/7.0	7.1			193.7	215/193.1	281		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal								RC	RC/RC	RC			RC	RC/RC	RC			RC	RC/RC	RC		

ACUTE2 Rev 1.0

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

Project# X5916

Client EDCC

Sample Description 007

Test started: Date 12/14/15 Time 1540

Test ended: Date 12/16/15 Time 1620

Test Species D. pulex ID# E2-F2

	0hour	24hour	48hour	72hour	96hour
Technician:	EB	RC	RC		
Time:	1540	1710	1620		
Temperature (°C):	24.2	24.7	24.3		

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
C/D		N/A																				
45.0	A		8	8	8			8.1	7.6/8.2	8.0			7.0	7.1/6.9	7.1			202	220/201	291		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
56.0	A		8	8	8			8.1	7.6/8.2	7.9			7.0	7.1/6.9	7.1			205	223/205	300		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	6																	
Chemistry Tech prerenewal/postrenewal								RC	RC/RC	RC			RC	RC/RC	RC			RC	RC/RC	RC		

ACUTE2 Rev 1.0

X5916

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

Project# X5916 Test started: Date 12/14/15 Time 1540

Client EDCC Test ended: Date 12/16/15 Time 1620

Sample Description 007 Test Species D. pulex ID# E2F2

Technician: 0hour EB 24hour RC 48hour RC 72hour ______ 96hour ______

Time: 0hour 1540 24hour 1710 48hour 1620 72hour ______ 96hour ______

Temperature (°C): 0hour 24.2 24hour 24.7 48hour 24.3 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	RC 12/14/15 24 230	48	72	96
56.0	A		8	8	6			8.1	7.5/8.2	7.8			7.0	7.1/6.9	7.1			209	248/207	308		
	B		8	8	6																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	6																	
75.0	A		8	8	8			8.1	7.4/8.1	7.8			6.9	7.1/6.9	7.0			222	247/222	322		
	B		8	8	5																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal								RC	RC/RC	RC			RC	RC/RC	RC			RC	RC/RC	RC		

ACUTE2 Rev 1.0

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

Project# X5916

Client EDCC

Sample Description 007

Test started: Date 12/14/15 Time 1540

Test ended: Date 12/16/15 Time 1620

Test Species D. pulex ID# E2F2

Technician:	Ohour EHB	24hour RC	48hour RC	72hour	96hour
Time:	Ohour 1540	24hour 1710	48hour 1620	72hour	96hour
Temperature (°C):	Ohour 24.2	24hour 24.7	48hour 24.3	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																				
100.0	A		8	8	8			8.2	7.2/8.0	7.7			6.8	7.1/6.8	7.0			240	25?/241	339		
	B		8	8	6																	
	C		8	8	6																	
	D		8	8	5																	
	E		8	8	8																	
pH adj 100.0	A		8						/					/					/			
	B		8																			
	C		8																			
	D		8																			
	E		8																			
Chemistry Tech prerenewal/postrenewal								RC	RC/RC	RC			RC	RC/RC	RC			RC	RC/RC	RC		

ACUTE2 Rev 1.0

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

Project# X5916

Client EDCC

Sample Description 007

Test started: Date 12/14/15 Time 1650

Test ended: Date 12/16/15 Time 1655

Test Species P. promela SID# BBL120915

Technician:	Ohour CR	24hour RC	48hour CR	72hour	96hour	
Time:	Ohour 1650	24hour 1515	48hour 1655	72hour	96hour	
Temperature (°C):	Ohour 24.5	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
0%		N/A																				
0 SOFF	A		8	8	8			8.2	8.0/8.3	8.2			7.4	7.9/7.2	7.1			173	218/210.9	247		
	B		8	7	7																	
	C		8	8	8																	
	D		8	8	8																	
RC 12/15 ₹	E		8	8	8																	
32.0	A		8	8	8			8.2	7.9/8.2	8.2			7.1	6.9/7.0	7.0			193	198/193.1	270		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal								RC	RC/RC	CR			RC	RC/RC	CR			RC	RC/RC	CR		

ACUTE2 Rev 1.0

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

Project# X5916

Client EDCC

Sample Description 007

Test started: Date 12/14/15 Time 1650

Test ended: Date 12/16/15 Time 1655

Test Species P. promelas ID# BAL120915

Technician:	Ohour CR	24hour RC	48hour CR	72hour	96hour
Time:	Ohour 1650	24hour 1515	48hour 1655	72hour	96hour
Temperature (°C):	Ohour 24.5	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
0		N/A																				
45.0	A		8	8	8			8.1	7.8/8.2	8.1			7.0	6.8/6.9	7.0			202	212/201	283		
	B		8	8	7																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
56.0	A		8	8	8			8.1	7.8/8.2	8.1			7.0	6.8/6.9	7.0			205	217/205	290		
	B		8	8	7																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal								RC	RC/RC	CR			RC	RC/RC	CR			RC	RC/RC	CR		

ACUTE2 Rev 1.0

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

Project# X5916

Client EDCC

Sample Description 007

Test started: Date 12/14/15 Time 1650

Test ended: Date 12/16/15 Time 1655

Test Species P. promelas ID# BHL120915

Technician: Ohour CR 24hour RC 48hour CR 72hour ____ 96hour ____

Time: Ohour 1650 24hour 1515 48hour 1655 72hour ____ 96hour ____

Temperature (°C): Ohour 24.5 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
40		N/A																				
56.0	A		8	8	8			8.1	7.8/8.2	8.1			7.0	6.9/6.9	7.0			209	219/201	225		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
75.0	A		8	8	8			8.1	7.8/8.1	8.0			6.9	6.8/6.9	6.9			322	232/229	312		
	B		8	8	8																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
Chemistry Tech prerenewal/postrenewal								RC	RC/RC	CR			RC	RC/RC	CR			RC	RC/RC	CR		

ACUTE2 Rev 1.0

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

Project# X5916

Client EDCC

Sample Description 007

Test started: Date 12/14/15 Time 1650

Test ended: Date 12/16/15 Time 1655

Test Species P. promelas ID# BAL120915

Technician:	0hour CR	24hour RC	48hour CR	72hour ____ 96hour ____
Time:	0hour 1650	24hour 1515	48hour 1655	72hour ____ 96hour ____
Temperature (°C):	0hour 24.5	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
		N/A																				
100.0	A		8	8	8			8.2	7.6/8.0	7.9			6.8	6.8/6.8	6.8			240	249/241	341		
	B		8	8	7																	
	C		8	8	8																	
	D		8	8	8																	
	E		8	8	8																	
pH adj 100.0	A		8						/					/					/			
	B		8																			
	C		8																			
	D		8																			
	E		8																			
Chemistry Tech prerenewal/postrenewal								RC	RC/RC	CR			RC	RC/RC	CR			RC	RC/RC	CR		

ACUTE2 Rev 1.0

APPENDIX C
STATISTICAL ANALYSES

Daphnid Acute Test-48 Hr Survival

Start Date:	12/14/2015	Test ID:	X5916DP	Sample ID:	AR0000752
End Date:	12/16/2015	Lab ID:	880630	Sample Type:	EFF2-Industrial
Sample Date:	12/13/2015	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	1.0000	1.0000
32	1.0000	1.0000	1.0000	1.0000	1.0000
45	1.0000	1.0000	1.0000	1.0000	1.0000
50	1.0000	1.0000	1.0000	1.0000	0.7500
56	0.7500	0.7500	1.0000	1.0000	0.7500
75	1.0000	0.6250	1.0000	1.0000	1.0000
100	1.0000	0.7500	0.7500	0.6250	1.0000

			Transform: Arcsin Square Root					Rank	1-Tailed
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Sum	Critical
D-Control	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5		
32	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5	27.50	16.00
45	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5	27.50	16.00
50	0.9500	0.9500	1.3239	1.0472	1.3931	11.684	5	25.00	16.00
56	0.8500	0.8500	1.1856	1.0472	1.3931	15.980	5	20.00	16.00
75	0.9250	0.9250	1.2968	0.9117	1.3931	16.600	5	25.00	16.00
100	0.8250	0.8250	1.1585	0.9117	1.3931	19.095	5	20.00	16.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.90762	0.934	-0.7013	1.26642
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	100	>100		1
Treatments vs D-Control				

ToxCalc v5.0.23

Reviewed by: EAB 12/18/15

Acute Fish Test-48 Hr Survival

Start Date:	12/14/2015	Test ID:	X5916PP	Sample ID:	AR0000752
End Date:	12/16/2015	Lab ID:	880630	Sample Type:	EFF2-Industrial
Sample Date:	12/13/2015	Protocol:	EPAAW02-EPA/821/R-02-01	Test Species:	PP-Pimephales promelas

Comments:

Conc-%	1	2	3	4	5
D-Control	1.0000	0.8750	1.0000	1.0000	1.0000
32	1.0000	1.0000	1.0000	1.0000	1.0000
45	1.0000	0.8750	1.0000	1.0000	1.0000
50	1.0000	0.8750	1.0000	1.0000	1.0000
56	1.0000	1.0000	1.0000	1.0000	1.0000
75	1.0000	1.0000	1.0000	1.0000	1.0000
100	1.0000	0.8750	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	0.9750	1.0000	1.3564	1.2094	1.3931	6.055	5		
32	1.0000	1.0256	1.3931	1.3931	1.3931	0.000	5	30.00	16.00
45	0.9750	1.0000	1.3564	1.2094	1.3931	6.055	5	27.50	16.00
50	0.9750	1.0000	1.3564	1.2094	1.3931	6.055	5	27.50	16.00
56	1.0000	1.0256	1.3931	1.3931	1.3931	0.000	5	30.00	16.00
75	1.0000	1.0256	1.3931	1.3931	1.3931	0.000	5	30.00	16.00
100	0.9750	1.0000	1.3564	1.2094	1.3931	6.055	5	27.50	16.00

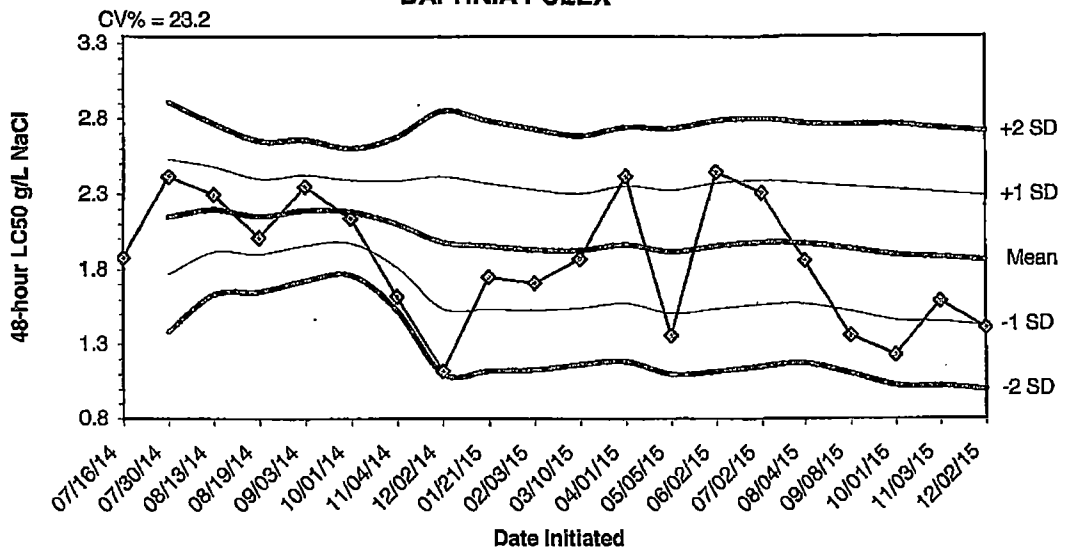
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.05)	0.5996	0.934	-2.0743	3.30824
Equality of variance cannot be confirmed				

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	100	>100		1
Treatments vs D-Control				

Reviewed by: EQB 12/18/15

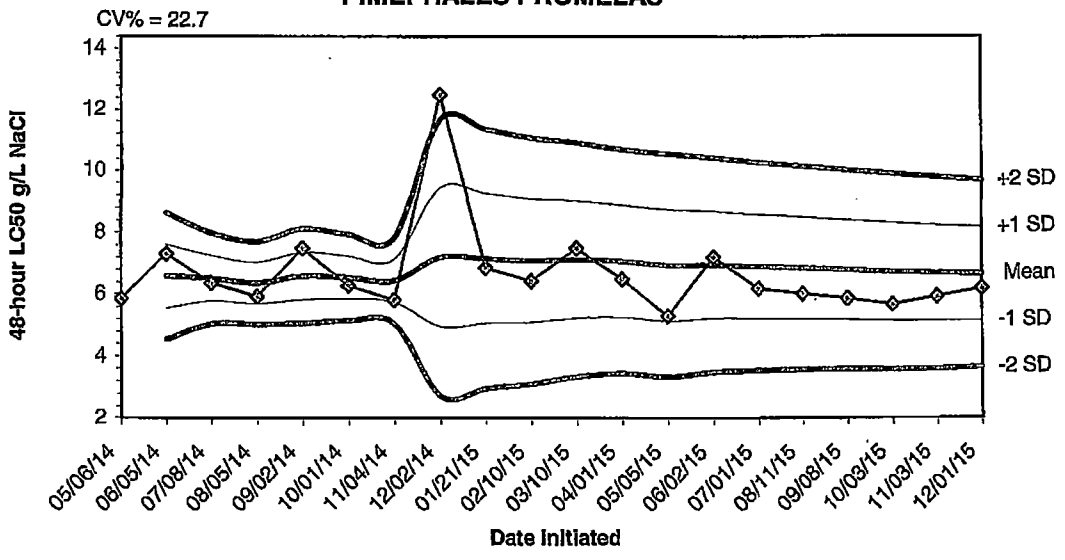
APPENDIX D
QUALITY ASSURANCE CHARTS

2015 48-HOUR ACUTE REFERENCE TOXICANT TEST RESULTS FOR DAPHNIA PULEX



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
07/16/14	1.8800					
07/30/14	2.4200	2.1500	1.7682	1.3863	2.5318	2.9137
08/13/14	2.3000	2.2000	1.9165	1.6329	2.4835	2.7671
08/19/14	2.0100	2.1525	1.9023	1.6520	2.4027	2.6530
09/03/14	2.3500	2.1920	1.9580	1.7239	2.4260	2.6601
10/01/14	2.1400	2.1833	1.9729	1.7625	2.3937	2.6041
11/04/14	1.6200	2.1029	1.8161	1.5294	2.3896	2.6764
12/02/14	1.1200	1.9800	1.5427	1.1054	2.4173	2.8546
01/21/15	1.7500	1.9544	1.5383	1.1221	2.3706	2.7868
02/03/15	1.7100	1.9300	1.5301	1.1302	2.3299	2.7298
03/10/15	1.8700	1.9245	1.5447	1.1649	2.3044	2.6842
04/01/15	2.4200	1.9658	1.5765	1.1871	2.3552	2.7446
05/05/15	1.3600	1.9192	1.5103	1.1014	2.3281	2.7371
06/02/15	2.4500	1.9571	1.5394	1.1218	2.3748	2.7925
07/02/15	2.3100	1.9807	1.5680	1.1553	2.3933	2.8060
08/04/15	1.8600	1.9731	1.5733	1.1735	2.3730	2.7728
09/08/15	1.3600	1.9371	1.5223	1.1076	2.3518	2.7665
10/01/15	1.2300	1.8978	1.4623	1.0268	2.3333	2.7687
11/03/15	1.5900	1.8816	1.4525	1.0235	2.3106	2.7397
12/02/15	1.4100	1.8580	1.4273	0.9966	2.2887	2.7194

2015 48-HOUR ACUTE REFERENCE TOXICANT TEST RESULTS FOR PIMEPHALES PROMELAS



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
05/06/14	5.8600					
06/05/14	7.3100	6.5850	5.5597	4.5344	7.6103	8.6356
07/08/14	6.3700	6.5133	5.7778	5.0422	7.2489	7.9844
08/05/14	5.9200	6.3650	5.6951	5.0253	7.0349	7.7047
09/02/14	7.4800	6.5880	5.8230	5.0581	7.3530	8.1179
10/01/14	6.2800	6.5367	5.8410	5.1453	7.2323	7.9280
11/04/14	5.8100	6.4329	5.7410	5.0491	7.1248	7.8167
12/02/14	12.5000	7.1913	4.9526	2.7139	9.4299	11.6686
01/21/15	6.8500	7.1533	5.0562	2.9590	9.2505	11.3477
02/10/15	6.4200	7.0800	5.0892	3.0984	9.0708	11.0616
03/10/15	7.4800	7.1164	5.2239	3.3314	9.0088	10.9013
04/01/15	6.4800	7.0633	5.2496	3.4359	8.8771	10.6908
05/05/15	5.2900	6.9269	5.1221	3.3173	8.7317	10.5366
06/02/15	7.2000	6.9464	5.2109	3.4753	8.6820	10.4175
07/01/15	6.1800	6.8953	5.2113	3.5272	8.5794	10.2635
08/11/15	6.0000	6.8394	5.1971	3.5548	8.4817	10.1240
09/08/15	5.8600	6.7818	5.1740	3.5662	8.3896	9.9974
10/03/15	5.6700	6.7200	5.1384	3.5567	8.3016	9.8833
11/03/15	5.9200	6.6779	5.1299	3.5819	8.2259	9.7739
12/01/15	6.1800	6.6530	5.1422	3.6314	8.1638	9.6746

APPENDIX E
AGENCY FORMS

Acute Forms
Daphnia pulex Survival

Permittee: El Dorado Chemical - Outfall 007
NPDES Permit Number: AR0000752/ AFIN 70-00040
Composite Collected **From: 12/13/15** **To: 12/13/15**
From: **To:**
Test Initiated: 12/14/15
Dilution Water Used: **Receiving Water** **X Reconstituted Water**

Dilution Series Results - Percent Survival

TIME OF READING	REP	0	32.0	45.0	50.0	56.0	75.0	100.0
24-hour	A	100.0	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	100.0
	C	100.0	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	100.0
	E	100.0	100.0	100.0	100.0	100.0	100.0	100.0
48-hour	A	100.0	100.0	100.0	100.0	75.0	100.0	100.0
	B	100.0	100.0	100.0	100.0	75.0	62.5	75.0
	C	100.0	100.0	100.0	100.0	100.0	100.0	75.0
	D	100.0	100.0	100.0	100.0	100.0	100.0	62.5
	E	100.0	100.0	100.0	75.0	75.0	100.0	100.0
	Mean	100.0	100.0	100.0	95.0	85.0	92.5	82.5

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 (100.0%) **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} = N/A% effluent
95 % confidence limits:
Method of LC_{50} calculation:
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 pulex 48 hour Acute Static Renewal
Chemical Parameters Chart*

Permittee: El Dorado Chemical - Outfall 007
NPDES Number: AR0000752/ AFIN 70-00040
Contact: Eddie Pearson
Analyst: Briggs, Callahan
Sample Collected **From:** **Date 12/13/15** **Time 1410**
To: **Date 12/13/15** **Time 1810**
Test Begin **Date 12/14/15** **Time 1540**
Test End **Date 12/16/15** **Time 1620**

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	8.2	8.3	8.0	24.2	24.7	24.3	36.0			48.0			7.4	7.2	7.3
32.0	8.2	8.2	8.0	24.2	24.7	24.3							7.1	7.0	7.1
45.0	8.1	8.2	8.0	24.2	24.7	24.3							7.0	6.9	7.1
50.0	8.1	8.2	7.9	24.2	24.7	24.3							7.0	6.9	7.1
56.0	8.1	8.2	7.8	24.2	24.7	24.3							7.0	6.9	7.1
75.0	8.1	8.1	7.8	24.2	24.7	24.3							6.9	6.9	7.0
100.0	8.2	8.0	7.7	24.2	24.7	24.3	20.0			80.0			6.8	6.8	7.0

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

Acute Forms
Pimephales promelas (Fathead minnow) Survival

Permittee: El Dorado Chemical - Outfall 007
NPDES Permit Number: AR0000752/ AFIN 70-00040
Composite Collected **From: 12/13/15** **To: 12/13/15**
From: **To:**
Test Initiated: 12/14/15
Dilution Water Used: **Receiving Water** **X Reconstituted Water**

Dilution Series Results - Percent Survival

TIME OF READING	REP	0	32.0	45.0	50.0	56.0	75.0	100.0
24-hour	A	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	B	87.5	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	100.0
	D	100.0	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	100.0
48-hour	A	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	B	87.5	100.0	87.5	87.5	100.0	100.0	87.5
	C	100.0	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	100.0
	E	100.0	100.0	100.0	100.0	100.0	100.0	100.0
	Mean	97.5	100.0	97.5	97.5	100.0	100.0	97.5

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 (100.0%) **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} = N/A% effluent
95 % confidence limits:
Method of LC_{50} calculation:
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: El Dorado Chemical - Outfall 007
NPDES Number: AR0000752/ AFIN 70-00040
Contact: Eddie Pearson
Analyst: Briggs, Callahan
Sample Collected **From:** **Date 12/13/15** **Time 1410**
To: **Date 12/13/15** **Time 1810**
Test Begin **Date 12/14/15** **Time 1650**
Test End **Date 12/16/15** **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	8.2	8.3	8.2	24.5	24.5	24.0	36.0			48.0			7.4	7.2	7.1
32.0	8.2	8.2	8.2	24.5	24.5	24.0							7.1	7.0	7.0
45.0	8.1	8.2	8.1	24.5	24.5	24.0							7.0	6.9	7.0
50.0	8.1	8.2	8.1	24.5	24.5	24.0							7.0	6.9	7.0
56.0	8.1	8.2	8.1	24.5	24.5	24.0							7.0	6.9	7.0
75.0	8.1	8.1	8.0	24.5	24.5	24.0							6.9	6.9	6.9
100.0	8.2	8.0	7.9	24.5	24.5	24.0	20.0			80.0			6.8	6.8	6.8

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

APPENDIX F
REPORT QUALITY ASSURANCE FORM

Bio-Analytical Laboratories

3240 Spurgin Road
Post Office Box 527
Doyline, LA 71023

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

REPORT QUALITY ASSURANCE FORM

Client: El Dorado Chemical Company

Project#: X5916

Chain of Custody Documents Checked by: RC 12/18/15
Technician/Date

Raw Data Documents Checked by: RC 12/18/15
Technician/Date

Statistical Analysis Package Checked by: EGB 12/4/15
Quality Manager/Date

Quality Control Data Checked by: EGB 12/18/15
Quality Manager/Date

Report Checked by: EGB 12/21/15
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 L. Bruggo, BS — 12/21/15

Quality Manager — **Date**

Report Rev. 3.0

November 23, 2015

Test Results of
Fourth Quarter
Chronic 7-Day Renewal
Biomonitoring Testing
for
Outfall 010
El Dorado, AR

Control No. 196046-1

Prepared for:

Mr. Eddie Pearson
El Dorado Chemical Company
4500 North West Avenue
El Dorado, AR 71730

Prepared by:

AMERICAN INTERPLEX CORPORATION
8600 Kanis Road
Little Rock, AR 72204-2322

El Dorado Chemical Company
ATTN: Mr. Eddie Pearson
4500 North West Avenue
El Dorado, AR 71730

Re: Chronic 7-Day Renewal utilizing *Pimephales promelas* (Fathead minnow) and *Ceriodaphnia dubia*
Outfall 010 - El Dorado, AR
NPDES Permit No. AR0000752

Dear Mr. Eddie Pearson:

This report is the analytical results and supporting information for the samples submitted to American Interplex Corporation (AIC). The following results are applicable only to the sample identified by the control number referenced above. Accurate assessment of the data requires access to the entire document. Each section of the report has been reviewed and approved by the laboratory director or qualified designee.

Testing procedures and Quality Assurance were in accordance with "Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms" EPA-821-R-02-013, Fourth Edition, October 2002. Test results are summarized below:

Method 1000.0 Chronic *Pimephales promelas* (Fathead minnow) Survival and Growth Test: The No Observable Effects Concentration (NOEC) for survival occurred at 2.1 % effluent, which is above the critical dilution of 1.6 %. The NOEC for growth occurred at 2.1 % effluent, which is above the critical dilution of 1.6 %. **The sample, therefore, PASSED both lethal and sub-lethal effects for the Fathead minnow test.**

Method 1002.0 Chronic *Ceriodaphnia dubia* Survival and Reproduction Test: The No Observable Effects Concentration (NOEC) for survival occurred at 2.1 % effluent, which is above the critical dilution of 1.6 %. The NOEC for reproduction occurred at 2.1 % effluent, which is above the critical dilution of 1.6 %. **The sample, therefore, PASSED both lethal and sub-lethal effects for the *Ceriodaphnia dubia* test.**

AMERICAN INTERPLEX CORPORATION

John Overbey
Laboratory Director

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Table of Contents

I. Control Acceptance Criteria

Pimephales promelas (Fathead minnow) Method 1000.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	100	PASS
Control Growth > or = 0.25 mg per Surviving minnow	0.332	PASS
Control Growth CV < or = 40%	11.3	PASS
Growth Minimum Significant Difference 12 to 30%	13.9	PASS
Critical Dilution CV < or = 40%	6.33	PASS

Ceriodaphnia dubia Method 1002.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	100	PASS
Control Reproduction > or = 15 per Surviving Female	22.1	PASS
Control CV < or = 40% per Surviving Female	18.4	PASS
Reproduction Minimum Significant Difference 13 to 47%	20.9	PASS
Critical Dilution CV < or = 40%	39.2	PASS

II. Outlined Report

A. Introduction

1. Permit Number: AR0000752
2. Test Requirements:
   Test Methods 1000.0 and 1002.0
3. Receiving Stream:

B. Source of Effluent/Dilution Water

1. Effluent Samples:
   a. Sampling Point: Outfall 010
   b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	6.5	7.5	7.8
pH (standard units)	7.1	7.4	7.8
Alkalinity (mg/l as CaCO3)	51	53	54
Hardness (mg/l as CaCO3)	46	46	44
Conductivity (umhos/cm)	490	500	520
Residual Chlorine (mg/l)	<0.05	<0.05	<0.05
Ammonia as N (mg/l)	0.34	0.41	5.6

2. Dilution Water Samples: Synthetic Soft Water #4271
   a. Dates Prepared: November 6 through November 20, 2015
   b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	7.8	7.8	8.4
pH (standard units)	7.5	7.8	7.8
Alkalinity (mg/l as CaCO3)	31	31	31
Hardness (mg/l as CaCO3)	41	41	41
Conductivity (umhos/cm)	160	170	170
Residual Chlorine (mg/l)	<0.05	<0.05	<0.05

C. Test Methods

1. Test methods used:
   Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, EPA-821-R-02-013; test Methods 1000.0 and 1002.0, Fathead Minnow Survival and Growth and *Ceriodaphnia dubia* Survival and Reproduction.
2. Endpoint: No Observable Effects Concentration (NOEC)
3. Test Conditions:

Pimephales promelas (Fathead minnow) Survival and Growth Method 1000.0

Date & Time Test Initiated:	November 10, 2015 at 1715
Date & Time Test Terminated:	November 17, 2015 at 1555
Type & Volume of Test Chamber:	500 ml disposable beaker
Volume of Sample:	250 ml
Number of Organisms per replicate:	8
Number of Replicates per dilution:	5

Ceriodaphnia dubia Survival and Growth Method 1002.0

Date & Time Test Initiated:	November 10, 2015 at 1530
Date & Time Test Terminated:	November 16, 2015 at 1345
Type & Volume of Test Chamber:	30 ml disposable beaker
Volume of Sample:	15 ml
Number of Organisms per replicate:	1
Number of Replicates per dilution:	10

4. Acclimation of test organisms: Obtained from in-house cultures
5. Test Temperature: 25 +/- 1 degree Celsius

D. Test Organisms

1. Scientific Name
   a. Test 1000.0 *Pimephales promelas*
   b. Test 1002.0 *Ceriodaphnia dubia*

III. Data Analysis

The data was analyzed using American Interplex Corporation's Laboratory Information Management Software based on Toxstat.

Pimephales promelas (Fathead minnow) survival data was transformed using the Arc Sine transformation. Normality and homogeneity of variance were checked using Shapiro-Wilk's. The survival data was then analyzed using Steel's Many-One Rank Test to determine the No Observable Effects Concentration (NOEC).

Fathead minnow growth data was analyzed for normality and homogeneity of variance using Shapiro-Wilk's and Bartlett's test. Dunnett's Test was used to determine the No Observable Effects Concentration (NOEC) for growth.

Ceriodaphnia dubia survival data was analyzed with Fisher's Exact Test. Reproduction data was analyzed using Kolmogorov's Test for Normality and analyzed with Steel's Many-One Rank Test to determine the No Observable Effects Concentration (NOEC) for Reproduction. Dunnett's Test was used to calculate the PMSD.

IV. Standard Reference Toxicants

American Interplex Corporation has an ongoing test organism culturing program. The sensitivity of the offspring is determined by performing a standard reference toxicant test with each effluent test. Sodium chloride in synthetic moderately hard water is used as prescribed in EPA-821-R-02-013.

Pimephales promelas (Fathead minnow)

Chronic reference tests are performed monthly.
A chronic reference test was performed on October 21, 2015 at 1600 to October 28, 2015 at 1530
The results were as follows: (Control No. 195350-1.)
Survival LC-50: 4872 mg/l
Growth IC-25: 3595 mg/l
Growth PMSD: 13

Ceriodaphnia dubia

Chronic reference tests are performed monthly.
A chronic reference test was performed on October 21, 2015 at 1400 to October 27, 2015 at 1550
The results were as follows: (Control No. 195350-2.)
Survival LC-50: 1732 mg/l
Growth IC-25: 879.2 mg/l
Growth PMSD: 20.2

V. Chemical Analysis/Quality Control

Parameter	Method	% Recovery	Relative % Difference
Alkalinity	SM 2320 B	NA	0.854
Hardness	EPA 200.7	100	2.28
pH	SM 4500-H+ B	100	0.672
Conductivity	EPA 120.1	96.6	1.40

VI. Organism History

Pimephales promelas (Fathead minnow)

Date: November 10, 2015
Age: <24 hours
Source: In-house culture
Water Chemistry Record:
Alkalinity: 57-64 mg/l
Hardness: 80-100 mg/l
Temperature: 25 deg.C

Ceriodaphnia dubia

Date: November 10, 2015
Age: <24 hours
Source: In-house culture
Water Chemistry Record:
Alkalinity: 57-64 mg/l
Hardness: 80-100 mg/l
Temperature: 25 deg.C

VII. Results Summary *Pimephales promelas*, Fathead minnow Larval Survival and Growth Test -- Method 1000.0

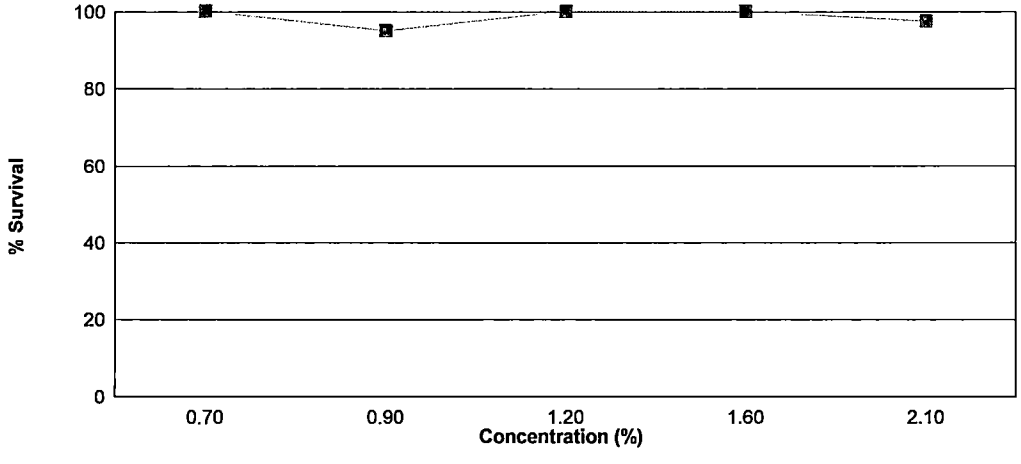
Larvae are exposed in a static renewal system for seven days to different concentrations of effluent with dilution water. Test results are based on the survival and growth (increase in weight) of the larvae.

Effluent dilutions for this test were 0.7 %, 0.9 %, 1.2 %, 1.6 %, 2.1 % in accordance with the NPDES permit.

The low flow or 'critical' dilution is specified in the NPDES permit as 1.6 % effluent.

The test was initiated on November 10, 2015 at 1715 and continued through November 17, 2015 at 1555. Statistical analyses were performed on the observed data and the no observable effects concentrations (NOECs) were as follows:

a.) NOEC survival = 2.1 % effluent
b.) NOEC growth = 2.1 % effluent



Summary of the 7-day Fathead Minnow Survival and Growth		
Concentration	Percent Survival	Mean Growth (mg)
Control	100	0.332
0.7 %	100	0.305
0.9 %	95.0	0.319
1.2 %	100	0.326
1.6 %	100	0.347
2.1 %	97.5	0.292

VII. Results Summary *Ceriodaphnia dubia*, Cladoceran Survival and Reproduction Test -- Method 1002.0

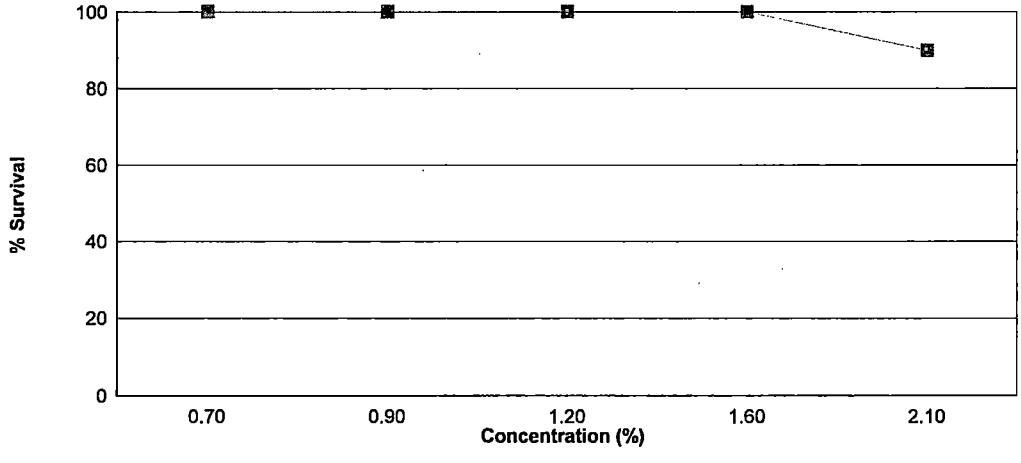
Neonates are exposed in a static renewal system to different concentrations of effluent with dilution water until 60% of surviving control organisms have three broods of offspring with an average of at least 15 young per female.

Effluent dilutions for this test were 0.7 %, 0.9 %, 1.2 %, 1.6 %, 2.1 % in accordance with the NPDES permit.

The low flow or 'critical' dilution is specified in the NPDES permit as 1.6 % effluent.

The test was initiated on November 10, 2015 at 1530 and continued through November 16, 2015 at 1345. Statistical analyses were performed on the observed data and the no observable effects concentrations (NOECs) were as follows:

a.) NOEC survival = 2.1 % effluent
b.) NOEC reproduction = 2.1 % effluent



Summary of the 6-day *Ceriodaphnia dubia* Survival and Reproduction Data		
Concentration	Percent Survival	Mean Reproduction
Control	100	22.1
0.7 %	100	20.8
0.9 %	100	18.8
1.2 %	100	21.0
1.6 %	100	18.2
2.1 %	90.0	19.1

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Survival

Date and Time Test Initiated: November 10, 2015 at 1715
Date and Time Test Terminated: November 17, 2015 at 1555

Concentration	Replicate	Number of Survivors						
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
Control	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
0.7 %	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
0.9 %	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	8	6
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
1.2 %	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
1.6 %	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
2.1 %	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	8	7
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Growth

Test Initiated: November 10, 2015 at 1715
Test Terminated: November 17, 2015 at 1555
Drying Started: November 16, 2015 at 1516
Drying Ended: November 18, 2015 at 1320

Concentration	Replicate	Weight of pan	Weight of pan + fish	Total weight of fish (g)	Original # of fish	Mean dry weight (mg)
Control	A	.94499	.94785	0.00286	8	0.358
	B	.94457	.94713	0.00256	8	0.320
	C	.94324	.94573	0.00249	8	0.311
	D	.94354	.94660	0.00306	8	0.382
	E	.94255	.94486	0.00231	8	0.289
0.7 %	A	.94777	.94995	0.00218	8	0.272
	B	.93798	.94039	0.00241	8	0.301
	C	.94177	.94435	0.00258	8	0.322
	D	.93772	.94046	0.00274	8	0.342
	E	.94205	.94436	0.00231	8	0.289
0.9 %	A	.94342	.94627	0.00285	8	0.356
	B	.93885	.94083	0.00198	8	0.248
	C	.94621	.94885	0.00264	8	0.330
	D	.94497	.94761	0.00264	8	0.330
	E	.94566	.94832	0.00266	8	0.332
1.2 %	A	.94259	.94498	0.00239	8	0.299
	B	.93941	.94189	0.00248	8	0.310
	C	.94730	.95004	0.00274	8	0.342
	D	.94544	.94814	0.00270	8	0.338
	E	.95312	.95584	0.00272	8	0.340
1.6 %	A	.94691	.94955	0.00264	8	0.330
	B	.94462	.94722	0.00260	8	0.325
	C	.95170	.95469	0.00299	8	0.374
	D	.95157	.95450	0.00293	8	0.366
	E	.95036	.95307	0.00271	8	0.339
2.1 %	A	.94792	.95037	0.00245	8	0.306
	B	.95249	.95441	0.00192	8	0.240
	C	.94887	.95129	0.00242	8	0.302
	D	.94601	.94832	0.00231	8	0.289
	E	.94390	.94647	0.00257	8	0.321

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: November 10, 2015 at 1530
Date and Time Test Terminated: November 16, 2015 at 1345

Concentration: Control													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	4	0	0	4	10	0.400
4	5	3	4	4	4	5	2	0	5	3	35	10	3.50
5	8	9	8	9	8	11	10	7	9	8	87	10	8.70
6	10	11	10	11	0	8	13	10	13	9	95	10	9.50
7													
8													
TOTAL	23	23	22	24	12	24	25	21	27	20	221	10	22.1

Concentration: 0.7 %													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	0	0	10	0.00
4	4	3	4	3	4	2	6	4	5	4	39	10	3.90
5	9	9	8	10	9	8	9	7	11	8	88	10	8.80
6	9	9	12	11	2	10	0	9	10	9	81	10	8.10
7													
8													
TOTAL	22	21	24	24	15	20	15	20	26	21	208	10	20.8

Concentration: 0.9 %													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	0	0	10	0.00
4	4	0	1	4	6	3	5	4	5	4	36	10	3.60
5	6	6	9	8	11	8	8	10	9	7	82	10	8.20
6	7	10	9	11	0	10	0	8	9	6	70	10	7.00
7													
8													
TOTAL	17	16	19	23	17	21	13	22	23	17	188	10	18.8

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: November 10, 2015 at 1530
Date and Time Test Terminated: November 16, 2015 at 1345

Concentration: 1.2 %													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	0	0	10	0.00
4	4	4	4	4	4	4	6	2	4	3	39	10	3.90
5	8	8	7	10	11	9	10	9	8	10	90	10	9.00
6	10	10	11	13	4	0	0	12	10	11	81	10	8.10
7													
8													
TOTAL	22	22	22	27	19	13	16	23	22	24	210	10	21.0

Concentration: 1.6 %													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	0	0	10	0.00
4	3	0	3	5	6	2	5	4	5	3	36	10	3.60
5	9	0	7	8	9	10	8	8	9	9	77	10	7.70
6	9	0	10	12	0	11	7	3	8	9	69	10	6.90
7													
8													
TOTAL	21	0	20	25	15	23	20	15	22	21	182	10	18.2

Concentration: 2.1 %													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	0	0	10	0.00
4	4	4	3X	3	5	0	5	3	4	1	32	9	3.56
5	8	10	X	9	9	7	6	9	10	10	78	9	8.67
6	10	8	X	5	6	14	7	11	9	11	81	9	9.00
7													
8													
TOTAL	22	22	3	17	20	21	18	23	23	22	191	10	19.1

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Survival

Transformation of Data — Transform: Arc Sin(Square Root(Y))

Group	Identification	Rep	Value	Transformed
1	Control	1	1.00000	1.39310
1	Control	2	1.00000	1.39310
1	Control	3	1.00000	1.39310
1	Control	4	1.00000	1.39310
1	Control	5	1.00000	1.39310
2	0.7 %	1	1.00000	1.39310
2	0.7 %	2	1.00000	1.39310
2	0.7 %	3	1.00000	1.39310
2	0.7 %	4	1.00000	1.39310
2	0.7 %	5	1.00000	1.39310
3	0.9 %	1	1.00000	1.39310
3	0.9 %	2	0.75000	1.04720
3	0.9 %	3	1.00000	1.39310
3	0.9 %	4	1.00000	1.39310
3	0.9 %	5	1.00000	1.39310
4	1.2 %	1	1.00000	1.39310
4	1.2 %	2	1.00000	1.39310
4	1.2 %	3	1.00000	1.39310
4	1.2 %	4	1.00000	1.39310
4	1.2 %	5	1.00000	1.39310
5	1.6 %	1	1.00000	1.39310
5	1.6 %	2	1.00000	1.39310
5	1.6 %	3	1.00000	1.39310
5	1.6 %	4	1.00000	1.39310
5	1.6 %	5	1.00000	1.39310
6	2.1 %	1	1.00000	1.39310
6	2.1 %	2	0.87500	1.20940
6	2.1 %	3	1.00000	1.39310
6	2.1 %	4	1.00000	1.39310
6	2.1 %	5	1.00000	1.39310

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Survival

Shapiro - Wilk's Test for Normality		Transform: Arc Sin(Square Root(Y))
D = 0.1227		
W = 0.5739		
Critical W = 0.9	(alpha = 0.01, N = 30)	
Critical W = 0.927	(alpha = 0.05, N = 30)	

Data FAIL normality test (alpha = 0.01).

Steel's Many-One Rank Test					Transform: Arc Sin(Square Root(Y))
Ho:Control<Treatment					
Group	Identification	Rank Sum	Critical Value	DF	Sig 0.05
1	Control				
2	0.7 %	27.50	16.00	5.00	
3	0.9 %	25.00	16.00	5.00	
4	1.2 %	27.50	16.00	5.00	
5	1.6 %	27.50	16.00	5.00	
6	2.1 %	25.00	16.00	5.00	

Critical values are 1 tailed (k=5)

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Growth

Shapiro - Wilk's Test for Normality		No Transformation
D = 0.02281		
W = 0.9653		
Critical W = 0.9	(alpha = 0.01, N = 30)	
Critical W = 0.927	(alpha = 0.05, N = 30)	
Data PASS normality test (alpha = 0.01).		

Bartlett's Test for Homogeneity of Variance		No Transformation
Calculated B1 statistic = 2.919		
Critical B = 15.086	(alpha = 0.01, df = 5)	
Data PASS B1 homogeneity test at 0.01 level.		

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Growth

ANOVA Table				No Transformation
SOURCE	DF	SS	MS	F
Between	5	0.00961	0.001922	2.022
Within (Error)	24	0.02281	0.0009504	
Total	29	0.03242		

Critical F = 3.9 (alpha = 0.01, df = 5,24)
2.62 (alpha = 0.05, df = 5,24)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Dunnett's Test - Table 1 of 2					No Transformation
Ho:Control<Treatment					
Group	Identification	Transformed Mean	Mean In Original Units	T Stat	Sig 0.05
1	Control	0.332	0.332		
2	0.7 %	0.3052	0.3052	1.375	
3	0.9 %	0.3192	0.3192	0.6565	
4	1.2 %	0.3258	0.3258	0.318	
5	1.6 %	0.3468	0.3468	-0.7591	
6	2.1 %	0.2916	0.2916	2.072	

Dunnett's critical value = 2.36 (1 Tailed, alpha = 0.05, df = 5,24)

Dunnett's Test - Table 2 of 2					No Transformation
Ho:Control<Treatment					
Group	Identification	Num of Reps	Min Sig Diff (In Orig. Units)	% of Control	Difference From Control
1	Control	5			
2	0.7 %	5	0.04601	13.9	0.0268
3	0.9 %	5	0.04601	13.9	0.0128
4	1.2 %	5	0.04601	13.9	0.0062
5	1.6 %	5	0.04601	13.9	-0.0148
6	2.1 %	5	0.04601	13.9	0.0404

Appendix A2: Statistics

Ceriodaphnia dubia Survival

Fisher's Exact Test

Identification	Alive	Dead	Total Animals
Control	10	0	10
0.7 %	10	0	10
Total	20	0	20

Critical Fisher's value (10,10,10) (alpha=0.05) is 6. b value is 10. Since b is greater than 6 there is NO SIGNIFICANT DIFFERENCE between CONTROL and TREATMENT at the 0.05 level.

Fisher's Exact Test

Identification	Alive	Dead	Total Animals
Control	10	0	10
0.9 %	10	0	10
Total	20	0	20

Critical Fisher's value (10,10,10) (alpha=0.05) is 6. b value is 10. Since b is greater than 6 there is NO SIGNIFICANT DIFFERENCE between CONTROL and TREATMENT at the 0.05 level.

Fisher's Exact Test

Identification	Alive	Dead	Total Animals
Control	10	0	10
1.2 %	10	0	10
Total	20	0	20

Critical Fisher's value (10,10,10) (alpha=0.05) is 6. b value is 10. Since b is greater than 6 there is NO SIGNIFICANT DIFFERENCE between CONTROL and TREATMENT at the 0.05 level.

Fisher's Exact Test

Identification	Alive	Dead	Total Animals
Control	10	0	10
1.6 %	10	0	10
Total	20	0	20

Critical Fisher's value (10,10,10) (alpha=0.05) is 6. b value is 10. Since b is greater than 6 there is NO SIGNIFICANT DIFFERENCE between CONTROL and TREATMENT at the 0.05 level.

Appendix A2: Statistics

Ceriodaphnia dubia Survival

Fisher's Exact Test			
Identification	Alive	Dead	Total Animals
Control	10	0	10
2.1 %	9	1	10
Total	19	1	20

Critical Fisher's value (10,10,10) (alpha=0.05) is 6. b value is 9. Since b is greater than 6 there is NO SIGNIFICANT DIFFERENCE between CONTROL and TREATMENT at the 0.05 level.

Summary of Fisher's Exact Test				
Group	Identification	Exposed	Dead	Sig 0.05
0	Control	10	0	
1	0.7 %	10	0	
2	0.9 %	10	0	
3	1.2 %	10	0	
4	1.6 %	10	0	
5	2.1 %	10	1	

Appendix A2: Statistics

Ceriodaphnia dubia Reproduction

Kolmogorov Test for Normality		No Transformation
D = 0.1586 D* = 1.244 Critical D* = 1.035	(alpha = 0.01, N = 60)	
Data FAIL normality test (alpha = 0.01).		

Steel's Many-One Rank Test					No Transformation
Ho:Control<Treatment					
Group	Identification	Rank Sum	Critical Value	DF	Sig 0.05
1	Control				
2	0.7 %	91.50	75.00	10.00	
3	0.9 %	77.00	75.00	10.00	
4	1.2 %	93.50	75.00	10.00	
5	1.6 %	82.00	75.00	10.00	
6	2.1 %	81.50	75.00	10.00	
Critical values are 1 tailed (k=5)					

Appendix A2: Statistics

Ceriodaphnia dubia Reproduction

Dunnett's Test for PMSD Calculation (excluding deaths if applicable)

ANOVA Table — No Transformation

SOURCE	DF	SS	MS	F
Between	5	109.5	21.9	1.151
Within (Error)	53	1008	19.02	
Total	58	1118		

Critical F = 3.39 (alpha = 0.01, df = 5,53)
2.39 (alpha = 0.05, df = 5,53)

Since F < Critical F FAIL TO REJECT Ho: All equal (alpha = 0.05)

Dunnett's Test - Table 1 of 2 — No Transformation

Ho:Control<Treatment

Group	Identification	Transformed Mean	Mean In Original Units	T Stat	Sig 0.05
1	Control	22.1	22.1		
2	0.7 %	20.8	20.8	0.6665	
3	0.9 %	18.8	18.8	1.692	
4	1.2 %	21	21	0.564	
5	1.6 %	18.2	18.2	2	
6	2.1 %	20.889	20.889	0.6043	

Dunnett's critical value = 2.31 (1 Tailed, alpha = 0.05, df [used] = 5,40) (Actual df = 5,53)
WARNING - Unequal replicate sizes. Critical values assuming equal replicate sizes have been used.

Dunnett's Test - Table 2 of 2 — No Transformation

Ho:Control<Treatment

Group	Identification	Num of Reps	Min Sig Diff (In Orig. Units)	% of Control	Difference From Control
1	Control	10			
2	0.7 %	10	4.505	20.4	1.3
3	0.9 %	10	4.505	20.4	3.3
4	1.2 %	10	4.505	20.4	1.1
5	1.6 %	10	4.505	20.4	3.9
6	2.1 %	9	4.629	20.9	1.211

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: November 10, 2015 at 0908
Date and Time Test Terminated: November 17, 2015 at 1555

Effluent Conc.: Control		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.8	8.1	7.8	8.4	8.4	7.9	8.5
	Final *1	7.6	7.4	7.7	7.8	7.3	8.4	7.4
	Final *2	7.1	7.7	8.4	8.5	8.2	9.0	
pH, units	Initial	7.5	7.5	7.8	7.4	7.8	7.8	7.3
	Final *1	7.6	7.4	7.4	7.4	7.8	7.2	7.3
	Final *2	7.8	7.8	7.9	7.7	7.7	7.7	
Alkalinity, mg CaCO3/l		31	NA	31	NA	31	NA	NA
Hardness, mg CaCO3/l		41	NA	41	NA	41	NA	NA
Conductivity, umhos/cm		160	140	170	140	170	180	150
Res. Chlorine, mg/l		<0.05	NA	<0.05	NA	<0.05	NA	NA

Effluent Conc.: 0.7 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.8	7.9	7.9	8.4	8.4	7.3	8.8
	Final *1	7.4	7.1	7.6	7.8	7.7	8.1	7.2
	Final *2	7.6	7.8	8.1	8.1	8.4	9.4	
pH, units	Initial	7.4	7.5	7.6	7.4	7.7	7.7	7.3
	Final *1	7.5	7.2	7.4	7.3	7.8	7.2	7.3
	Final *2	7.9	7.7	7.8	7.7	7.7	7.7	

Effluent Conc.: 0.9 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.1	7.9	7.9	8.2	7.9	7.7	8.9
	Final *1	7.6	7.3	7.8	7.7	7.6	8.6	7.3
	Final *2	7.5	7.9	8.5	8.6	8.3	9.1	
pH, units	Initial	7.4	7.5	7.6	7.4	7.7	7.8	7.3
	Final *1	7.5	7.4	7.4	7.4	7.8	7.2	7.3
	Final *2	7.8	7.8	7.9	7.8	7.7	7.7	

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: November 10, 2015 at 0908
Date and Time Test Terminated: November 17, 2015 at 1555

Effluent Conc.: 1.2 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.6	8.0	7.9	8.3	8.2	7.7	8.7
	Final *1	7.3	7.6	8.0	7.5	7.6	8.2	7.3
	Final *2	6.9	8.1	8.5	8.4	7.9	9.1	
pH, units	Initial	7.4	7.5	7.5	7.4	7.7	7.7	7.3
	Final *1	7.5	7.4	7.5	7.4	7.8	7.2	7.3
	Final *2	7.9	7.8	7.9	7.8	7.7	7.8	

Effluent Conc.: 1.6 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.7	8.0	7.9	8.4	8.3	7.5	8.4
	Final *1	7.7	7.7	7.7	7.8	7.5	8.3	7.2
	Final *2	7.2	7.5	8.4	8.5	8.2	9.2	
pH, units	Initial	7.3	7.4	7.5	7.4	7.7	7.8	7.3
	Final *1	7.6	7.4	7.5	7.4	7.8	7.2	7.3
	Final *2	7.9	7.8	7.9	7.8	7.7	7.7	
Alkalinity, mg CaCO3/l		32	NA	34	NA	32	NA	NA
Hardness, mg CaCO3/l		44	NA	42	NA	40	NA	NA
Conductivity, umhos/cm		170	140	170	140	170	180	140
Res. Chlorine, mg/l		<0.05	NA	<0.05	NA	<0.05	NA	NA

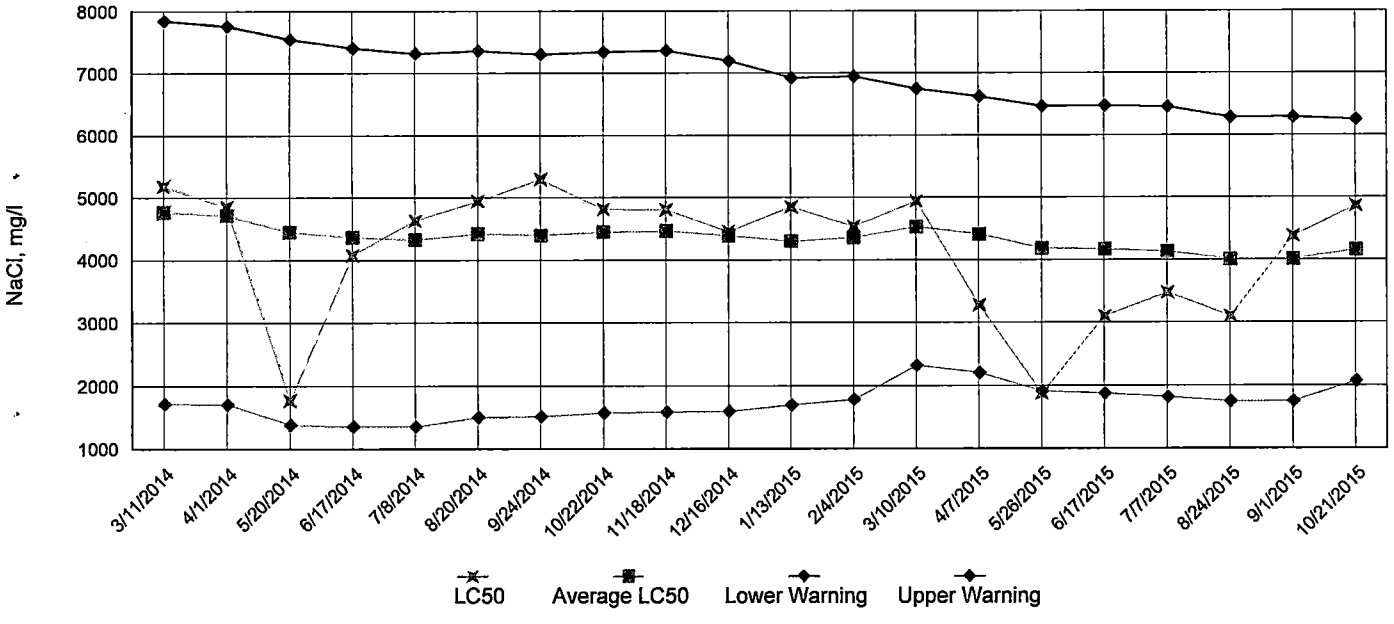
Effluent Conc.: 2.1 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.8	7.9	7.8	8.1	8.2	7.5	8.8
	Final *1	7.3	7.3	7.7	8.0	7.8	8.3	7.0
	Final *2	7.5	8.0	8.4	8.3	8.4	9.4	
pH, units	Initial	7.4	7.5	7.5	7.4	7.7	7.8	7.4
	Final *1	7.6	7.4	7.4	7.3	7.8	7.2	7.2
	Final *2	7.9	7.8	7.9	7.7	7.8	7.8	

*1 = data from the *Pimephales promelas* (Fathead Minnow) test *2 = data from the *Ceriodaphnia dubia* test

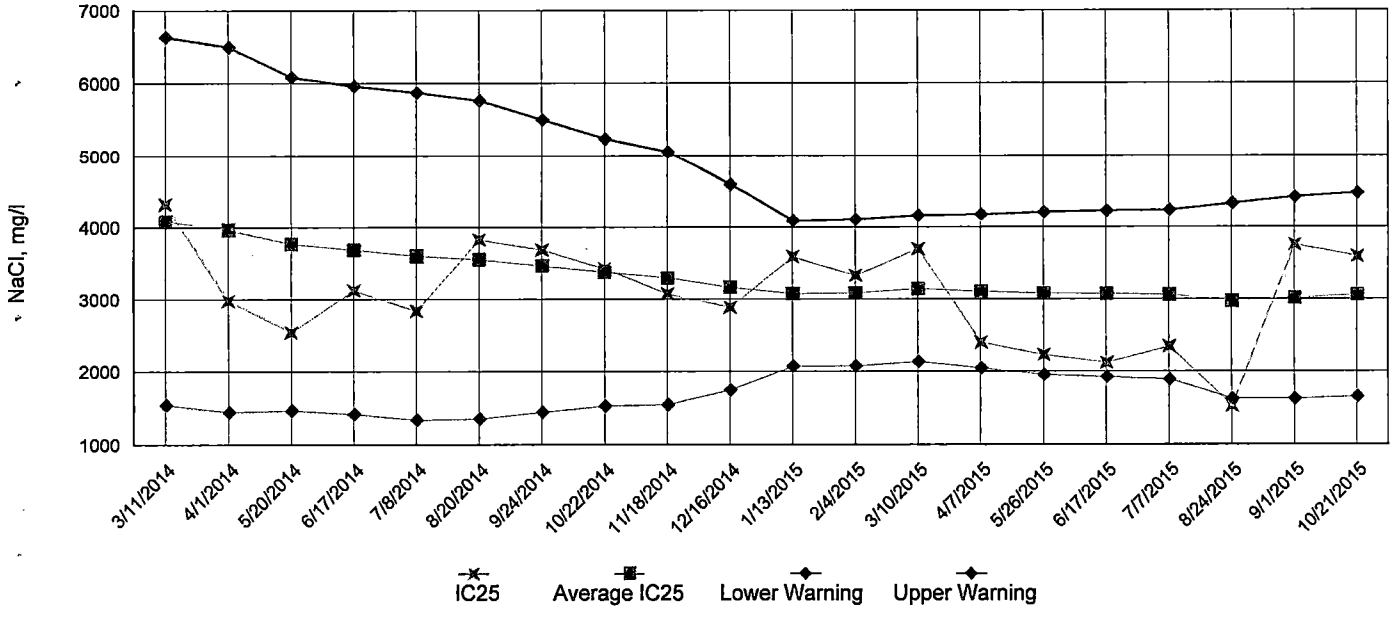
Appendix A4: Test 1000.0

Chronic Reference Toxicant, *Pimephales promelas* (Fathead Minnow)

LC50 Survival Data



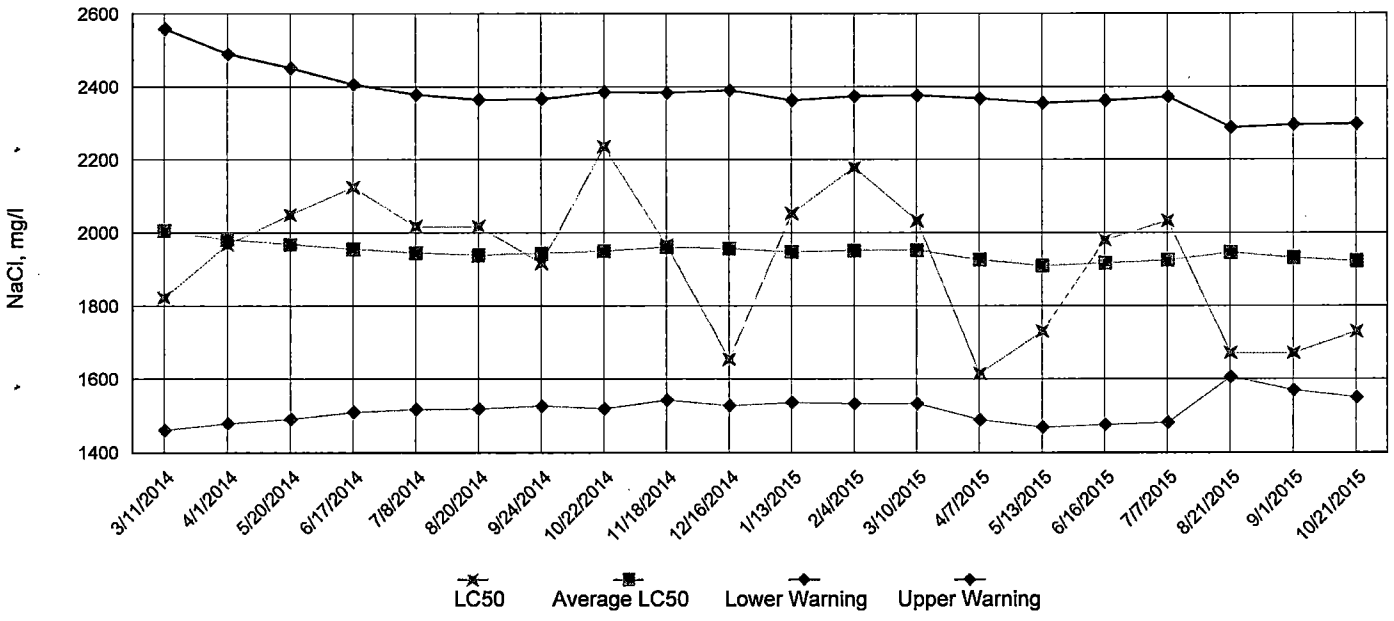
IC25 Growth Data



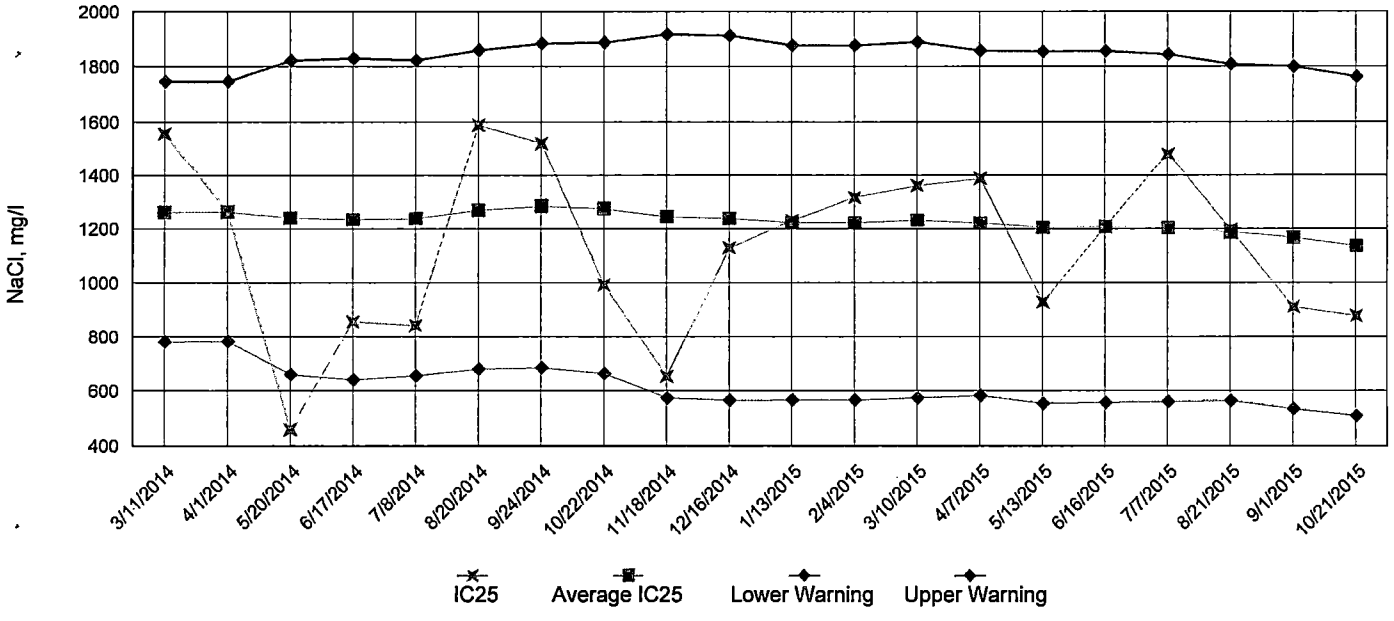
Appendix A4: Test 1002.0

Chronic Reference Toxicant, *Ceriodaphnia dubia*

LC50 Survival Data



IC25 Reproduction Data



Appendix B: Test 1000.0

SUMMARY REPORTING FORMS
CHRONIC BIOMONITORING
Pimephales promelas (Fathead Minnow)
SURVIVAL AND GROWTH

Permittee: El Dorado Chemical Company

NPDES No.: AR0000752

Date and Time Test Initiated: November 10, 2015 at 1715
Date and Time Test Terminated: November 17, 2015 at 1555
Dilution water used: Synthetic Soft Water #4271

DATA TABLE FOR SURVIVAL

Effluent Conc. %	Percent Survival in replicate chambers A	B	C	D	E	Mean percent survival 24 hr	48 hr	7 days	CV%
Control	100	100	100	100	100	100	100	100	0.00
0.7 %	100	100	100	100	100	100	100	100	0.00
0.9 %	100	75.0	100	100	100	100	100	95.0	11.8
1.2 %	100	100	100	100	100	100	100	100	0.00
1.6 %	100	100	100	100	100	100	100	100	0.00
2.1 %	100	87.5	100	100	100	100	100	97.5	5.73

DATA TABLE FOR GROWTH

Effluent Conc. %	Average dry weight, mg replicate chambers A	B	C	D	E	Mean dry weight, mg	CV%
Control	0.358	0.320	0.311	0.382	0.289	0.332	11.3
0.7 %	0.272	0.301	0.322	0.342	0.289	0.305	9.00
0.9 %	0.356	0.248	0.330	0.330	0.332	0.319	12.9
1.2 %	0.299	0.310	0.342	0.338	0.340	0.326	6.10
1.6 %	0.330	0.325	0.374	0.366	0.339	0.347	6.33
2.1 %	0.306	0.240	0.302	0.289	0.321	0.292	10.6

CV = Coefficient of variation = standard deviation * 100 / mean

Appendix B: Test 1000.0

SUMMARY REPORTING FORMS
CHRONIC BIOMONITORING
Pimephales promelas (Fathead Minnow)
SURVIVAL AND GROWTH

1. Steel's Many-One Rank Test:

   Is the mean survival significantly different (p=0.05) than the control survival for the % effluent corresponding to (lethality):

a.) LOW FLOW OR CRITICAL DILUTION	(1.6 %)	____YES	X NO
b.) 1/2 LOW FLOW DILUTION	(NA)	____YES	____NO

2. Dunnett's Test:

   Is the mean dry weight (growth) significantly different (p=0.05) than the control's dry weight (growth) for the % effluent corresponding to (significant non-lethal effects):

a.) LOW FLOW OR CRITICAL DILUTION	(1.6 %)	____YES	X NO
b.) 1/2 LOW FLOW DILUTION	(NA)	____YES	____NO

3. If you answered NO to 1.a) enter [0] otherwise enter [1]: 0 (TLP6C)

4. If you answered NO to 2.a) enter [0] otherwise enter [1]: 0 (TGP6C)

5. NOEC Pimephales Lethality: 2.1 % (TOP6C)

6. LOEC Pimephales Lethality: 2.1 % (TXP6C)

7. NOEC Pimephales Sublethality: 2.1 % (TPP6C)

8. LOEC Pimephales Sublethality: 2.1 % (TYP6C)

9. Coefficient of variation for Pimephales growth: 11.3 (TQP6C)

Appendix B: Test 1000.0

CHRONIC TOXICITY SUMMARY FORM
Pimephales promelas (Fathead minnow)
CHEMICAL PARAMETERS CHART

PERMITTEE: El Dorado Chemical Company
NPDES NO.: AR0000752
CONTACT: Mr. Eddie Pearson
ANALYST: 280, 304, 310, 314

Test Initiated: DATE: November 10, 2015 TIME: 1715
Test Terminated: DATE: November 17, 2015 TIME: 1555

DILUTION Control	DAY 1	2	3	4	5	6	7
D.O. Initial	7.8	8.1	7.8	8.4	8.4	7.9	8.5
Final	7.6	7.4	7.7	7.8	7.3	8.4	7.4
pH Initial	7.5	7.5	7.8	7.4	7.8	7.8	7.3
Final	7.6	7.4	7.4	7.4	7.8	7.2	7.3
Alkalinity	31	NA	31	NA	31	NA	NA
Hardness	41	NA	41	NA	41	NA	NA
Conductivity	160	140	170	140	170	180	150
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 0.7 %	DAY 1	2	3	4	5	6	7
D.O. Initial	7.8	7.9	7.9	8.4	8.4	7.3	8.8
Final	7.4	7.1	7.6	7.8	7.7	8.1	7.2
pH Initial	7.4	7.5	7.6	7.4	7.7	7.7	7.3
Final	7.5	7.2	7.4	7.3	7.8	7.2	7.3
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	160	140	170	140	170	180	140
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 0.9 %	DAY 1	2	3	4	5	6	7
D.O. Initial	8.1	7.9	7.9	8.2	7.9	7.7	8.9
Final	7.6	7.3	7.8	7.7	7.6	8.6	7.3
pH Initial	7.4	7.5	7.6	7.4	7.7	7.8	7.3
Final	7.5	7.4	7.4	7.4	7.8	7.2	7.3
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	160	140	170	140	170	180	150
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 1.2 %	DAY 1	2	3	4	5	6	7
D.O. Initial	7.6	8.0	7.9	8.3	8.2	7.7	8.7
Final	7.3	7.6	8.0	7.5	7.6	8.2	7.3
pH Initial	7.4	7.5	7.5	7.4	7.7	7.7	7.3
Final	7.5	7.4	7.5	7.4	7.8	7.2	7.3
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	160	140	170	140	170	180	140
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 1.6 %	DAY 1	2	3	4	5	6	7
D.O. Initial	7.7	8.0	7.9	8.4	8.3	7.5	8.4
Final	7.7	7.7	7.7	7.8	7.5	8.3	7.2
pH Initial	7.3	7.4	7.5	7.4	7.7	7.8	7.3
Final	7.6	7.4	7.5	7.4	7.8	7.2	7.3
Alkalinity	32	NA	34	NA	32	NA	NA
Hardness	44	NA	42	NA	40	NA	NA
Conductivity	170	140	170	140	170	180	140
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 2.1 %	DAY 1	2	3	4	5	6	7
D.O. Initial	7.8	7.9	7.8	8.1	8.2	7.5	8.8
Final	7.3	7.3	7.7	8.0	7.8	8.3	7.0
pH Initial	7.4	7.5	7.5	7.4	7.7	7.8	7.4
Final	7.6	7.4	7.4	7.3	7.8	7.2	7.2
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	170	150	170	140	170	190	150
Chlorine	NA	NA	NA	NA	NA	NA	NA

Appendix B: Test 1002.0

SUMMARY REPORTING FORMS
CHRONIC BIOMONITORING
Ceriodaphnia dubia
SURVIVAL AND REPRODUCTION

Permittee: El Dorado Chemical Company

NPDES No.: AR0000752

Date and Time Test Initiated: November 10, 2015 at 1530
Date and Time Test Terminated: November 16, 2015 at 1345
Dilution water used: Synthetic Soft Water #4271

PERCENT SURVIVAL

		Percent Effluent				
Time of Reading	Control	0.7 %	0.9 %	1.2 %	1.6 %	2.1 %
24 hour	100	100	100	100	100	100
48 hour	100	100	100	100	100	100
6 day	100	100	100	100	100	90.0

NUMBER OF YOUNG PRODUCED PER FEMALE @ 6 DAYS

		Percent Effluent				
Replicates	Control	0.7 %	0.9 %	1.2 %	1.6 %	2.1 %
A	23	22	17	22	21	22
B	23	21	16	22	0	22
C	22	24	19	22	20	3
D	24	24	23	27	25	17
E	12	15	17	19	15	20
F	24	20	21	13	23	21
G	25	15	13	16	20	18
H	21	20	22	23	15	23
I	27	26	23	22	22	23
J	20	21	17	24	21	22
Mean per Adult	22.1	20.8	18.8	21.0	18.2	19.1
Mean per Surviving Adult	22.1	20.8	18.8	21.0	18.2	20.9
CV %	18.4	17.4	17.9	19.2	39.2	10.3

CV = Coefficient of variation = standard deviation * 100 / mean
(calculated based on young produced by surviving females)

Appendix B: Test 1002.0

SUMMARY REPORTING FORMS
CHRONIC BIOMONITORING
Ceriodaphnia dubia
SURVIVAL AND REPRODUCTION

1. Fisher's Exact Test:

   Is the mean survival significantly different (p=0.05) than the control survival for the % effluent corresponding to (lethality):

a.) LOW FLOW OR CRITICAL DILUTION	(1.6 %)	____YES	X NO
b.) 1/2 LOW FLOW DILUTION	(NA)	____YES	____NO

2. Steel's Many-One Rank Test:

   Is the mean number of young produced per female significantly different (p=0.05) than the control's number of young per female for the % effluent corresponding to (significant non-lethal effects):

a.) LOW FLOW OR CRITICAL DILUTION	(1.6 %)	____YES	X NO
b.) 1/2 LOW FLOW DILUTION	(NA)	____YES	____NO

3. If you answered NO to 1.a) enter [0] otherwise enter [1]: 0 (TLP3B)

4. If you answered NO to 2.a) enter [0] otherwise enter [1]: 0 (TGP3B)

5. NOEC Ceriodaphnia Lethality: 2.1 % (TOP3B)

6. LOEC Ceriodaphnia Lethality: 2.1 % (TXP3B)

7. NOEC Ceriodaphnia Sublethality: 2.1 % (TPP3B)

8. LOEC Ceriodaphnia Sublethality: 2.1 % (TYP3B)

9. Coefficient of variation for Ceriodaphnia Reproduction: 39.2 (TQP3B)

AMERICAN INTERPLEX CORPORATION
LABORATORIES

Appendix B: Test 1002.0

CHRONIC TOXICITY SUMMARY FORM
Ceriodaphnia dubia
CHEMICAL PARAMETERS CHART

PERMITTEE: El Dorado Chemical Company
NPDES NO.: AR0000752
CONTACT: Mr. Eddie Pearson
ANALYST: 280, 304, 310, 314

Test Initiated: DATE: November 10, 2015 TIME: 1530
Test Terminated: DATE: November 16, 2015 TIME: 1345

DILUTION	DAY						
Control	1	2	3	4	5	6	7
D.O. Initial	7.8	8.1	7.8	8.4	8.4	7.9	8.5
Final	7.1	7.7	8.4	8.5	8.2	9.0	--
pH Initial	7.5	7.5	7.8	7.4	7.8	7.8	7.3
Final	7.8	7.8	7.9	7.7	7.7	7.7	--
Alkalinity	31	NA	31	NA	31	NA	NA
Hardness	41	NA	41	NA	41	NA	NA
Conductivity	160	140	170	140	170	180	150
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION	DAY						
0.7 %	1	2	3	4	5	6	7
D.O. Initial	7.8	7.9	7.9	8.4	8.4	7.3	8.8
Final	7.6	7.8	8.1	8.1	8.4	9.4	--
pH Initial	7.4	7.5	7.6	7.4	7.7	7.7	7.3
Final	7.9	7.7	7.8	7.7	7.7	7.7	--
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	160	140	170	140	170	180	140
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
0.9 %	1	2	3	4	5	6	7
D.O. Initial	8.1	7.9	7.9	8.2	7.9	7.7	8.9
Final	7.5	7.9	8.5	8.6	8.3	9.1	--
pH Initial	7.4	7.5	7.6	7.4	7.7	7.8	7.3
Final	7.8	7.8	7.9	7.8	7.7	7.7	--
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	160	140	170	140	170	180	150
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
1.2 %	1	2	3	4	5	6	7
D.O. Initial	7.6	8.0	7.9	8.3	8.2	7.7	8.7
Final	6.9	8.1	8.5	8.4	7.9	9.1	--
pH Initial	7.4	7.5	7.5	7.4	7.7	7.7	7.3
Final	7.9	7.8	7.9	7.8	7.7	7.8	--
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	160	140	170	140	170	180	140
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
1.6 %	1	2	3	4	5	6	7
D.O. Initial	7.7	8.0	7.9	8.4	8.3	7.5	8.4
Final	7.2	7.5	8.4	8.5	8.2	9.2	--
pH Initial	7.3	7.4	7.5	7.4	7.7	7.8	7.3
Final	7.9	7.8	7.9	7.8	7.7	7.7	--
Alkalinity	32	NA	34	NA	32	NA	NA
Hardness	44	NA	42	NA	40	NA	NA
Conductivity	170	140	170	140	170	180	140
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION	DAY						
2.1 %	1	2	3	4	5	6	7
D.O. Initial	7.8	7.9	7.8	8.1	8.2	7.5	8.8
Final	7.5	8.0	8.4	8.3	8.4	9.4	--
pH Initial	7.4	7.5	7.5	7.4	7.7	7.8	7.4
Final	7.9	7.8	7.9	7.7	7.8	7.8	--
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	170	150	170	140	170	190	150
Chlorine	NA	NA	NA	NA	NA	NA	NA

AMERICAN INTERPLEX CORPORATION
LABORATORIES

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: El Dorado Chemical Company
Project Reference: Quarterly - Permit AR0000752
Project Manager: Mr. Eddie Pearson
Sampled By: Edward L Pearson

PO No.

AIC CONTROL NO: 19600lp
AIC PROPOSAL NO:
Carrier: Rush
Received Temperature C: 0.1

AIC No.	Sample Identification	Date/Time Collected	GRAB	COMP	MATRIX WATER	MATRIX SOIL	NO OF BOTTLES	ANALYSES REQUESTED: Chronic - CD, FH	Remarks
1	010	11-09-15 1000		X	X		1	X	
		Container Type						P	
		Preservative						NO	

Field pH calibration on _____ @ _____
Buffer:

G = Glass P = Plastic V = VOA vials H = HCl to pH2 T = Sodium Thiosulfate
NO = none S = Sulfuric acid pH2 N = Nitric acid pH2 B = NaOH to pH12 Z = Zinc acetate A=$(NH_4)_2SO_4$, NH_4OH

Turnaround Time Requested: (Please circle)
NORMAL or EXPEDITED IN ____ DAYS
Expedited results requested by: _____
Who should AIC contact with questions:
Phone 870-312-1397 Fax:
Report Attention to: Mr. Eddie Pearson
Report Address to: 4500 North West Avenue
El Dorado, AR 71730
epearson@edc-ark.com

Relinquished By:	Date/Time	Received By:	Date/Time
Edward L Pearson	11-09-15 1200		
Relinquished By:	Date/Time	Received in Lab By:	Date/Time
			11/9/15 1445

Comments:

FORM 0060

AMERICAN INTERPLEX CORPORATION
LABORATORIES

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: El Dorado Chemical Company
Project Reference: Quarterly - Permit AR0000752
Project Manager: Mr. Eddie Pearson
Sampled By: Edward L Pearson

PO No.

MATRIX

AIC CONTROL NO: 196046
AIC PROPOSAL NO:
Carrier: Rush
Received Temperature C: 1.7°C

AIC No.	Sample Identification	Date/Time Collected	GRAB	COMP	WATER	SOIL		NO OF BOTTLES	ANALYSES REQUESTED: Chronic - CD, FH	Remarks
2	010	11-11-15 1000		X	X			1	X	
		Container Type							P	Field pH calibration
		Preservative							NO	on _____ @ _____ Buffer:

G = Glass P = Plastic V = VOA vials H = HCl to pH2 T = Sodium Thiosulfate
NO = none S = Sulfuric acid pH2 N = Nitric acid pH2 B = NaOH to pH12 Z = Zinc acetate A=$(NH_4)_2SO_4$, NH_4OH

Turnaround Time Requested: (Please circle)
(NORMAL) or EXPEDITED IN ____ DAYS
Expedited results requested by: _____
Who should AIC contact with questions:
Phone 870-312-1397 Fax:
Report Attention to: Mr. Eddie Pearson
Report Address to: 4500 North West Avenue
El Dorado, AR 71730
epearson@edc-ark.com

Relinquished By:	Date/Time	Received By:	Date/Time
Edward L Pearson	11-11-15 1200		
Relinquished By:	Date/Time	Received in Lab By:	Date/Time
		Eugene Hopkins	11-11-15 1450

Comments:

FORM 0060

AMERICAN INTERPLEX CORPORATION
LABORATORIES

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: El Dorado Chemical Company
Project Reference: Quarterly - Permit AR0000752
Project Manager: Mr. Eddie Pearson
Sampled By: Edward L Pearson
PO No.:

AIC CONTROL NO: 196046
AIC PROPOSAL NO:
Carrier: Rush
Received Temperature C: 0.6°C

AIC No.	Sample Identification	Date/Time Collected	GRAB	COMP	WATER	SOIL		NO OF BOTTLES	Chronic - CD, FH												Remarks
3	010	11-13-15 1000		X	X			1	X												
		Container Type							P												Field pH calibration on ______ @ ______
		Preservative							NO												Buffer:

G = Glass P = Plastic V = VOA vials H = HCl to pH2 T = Sodium Thiosulfate
NO = none S = Sulfuric acid pH2 N = Nitric acid pH2 B = NaOH to pH12 Z = Zinc acetate $A=(NH_4)_2SO_4, NH_4OH$

Turnaround Time Requested: (Please circle)
NORMAL (circled) or EXPEDITED IN ____ DAYS
Expedited results requested by: ______________
Who should AIC contact with questions:
Phone 870-312-1397 Fax:
Report Attention to: Mr. Eddie Pearson
Report Address to: 4500 North West Avenue
El Dorado, AR 71730
epearson@edc-ark.com

Relinquished By:	Date/Time	Received By:	Date/Time
Edward L Pearson	11-13-15 1200		
Relinquished By:	Date/Time	Received in Lab By:	Date/Time
		[signature]	11-13-15 1450

Comments:

FORM 0060

November 25, 2015

Test Results of
Fourth Quarter
Acute 48 hour Renewal
Biomonitoring Testing
for
Outfall 010
El Dorado, AR

Control No. 196142-1

Prepared for:

Mr. Eddie Pearson
El Dorado Chemical Company
4500 North West Avenue
El Dorado, AR 71730

Prepared by:

AMERICAN INTERPLEX CORPORATION
8600 Kanis Road
Little Rock, AR 72204-2322

El Dorado Chemical Company
ATTN: Mr. Eddie Pearson
4500 North West Avenue
El Dorado, AR 71730

Re: Acute 48 hour Renewal Biomonitoring utilizing *Pimephales promelas* (Fathead Minnow) and *Daphnia pulex*
Outfall 010 - El Dorado, AR
Client NPDES Permit No. AR0000752

Dear Mr. Eddie Pearson:

This report is the analytical results and supporting information for the samples submitted to American Interplex Corporation (AIC). The following results are applicable only to the sample identified by the control number referenced above. Accurate assessment of the data requires access to the entire document. Each section of the report has been reviewed and approved by the appropriate Chief Operating Officer or qualified designee.

Testing procedures and Quality Assurance were in accordance with "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine Organisms" EPA-821-R-02-012, Fifth Edition, October 2002. Test results are summarized below:

Acute *Pimephales promelas* (Fathead Minnow) Survival Test: The No Observable Effects Concentration (NOEC) for survival was 23% effluent, and the LC-50 value was >23% effluent; the sample, therefore, **PASSED** at low flow of 23% effluent for lethal effects.

Acute *Daphnia pulex* Survival Test: The No Observable Effects Concentration (NOEC) for survival was <7% effluent, and the LC-50 value was 7.95% effluent; the sample, therefore, **FAILED** at low flow of 23% effluent for lethal effects.

AMERICAN INTERPLEX CORPORATION

John Overbey
Chief Operating Officer

PDF cc: El Dorado Chemical Company
ATTN: Ms. Vee Ann Poole
vapoole@edc-ark.com

El Dorado Chemical Company
ATTN: Mr. Eddie Pearson
epearson@edc-ark.com

Table of Contents

I. Introduction and Summary

Biomonitoring testing of 48-hour renewal definitive toxicity tests using *Daphnia pulex* and *Pimephales promelas* were performed.

The *Daphnia pulex* test was conducted from November 11, 2015 at 1730 to November 13, 2015 at 1540.

The *Pimephales promelas* test was conducted from November 11, 2015 at 1710 to November 13, 2015 at 1555.

The tests were performed in accordance with EPA-821-R-02-012. Statistical analyses were performed on the observed data.

The tests were conducted in temperature and light cycle controlled environmental chamber. The test temperature was 25 degrees C +/- 1 degree for the *Daphnia pulex* and 25 degrees C +/- 1 degree for the *Pimephales promelas*.

II. Control Acceptance Criteria

ORGANISM	CRITERIA	RESULTS	PASS/FAIL
Daphnia pulex	Control Survival >= 90%	100	PASS
Pimephales promelas	Control Survival >= 90%	100	PASS

III. Outlined Report

A. Introduction

1. Permit Number: AR0000752
2. Test Requirements: 48-hour renewal definitive toxicity test using:
   Daphnia pulex
   Pimephales promelas

B. Source of Effluent/Dilution Water

1. Effluent Samples:
   a. Sampling Point: Outfall 010
      November 12
   b. Chemical Data:

Analysis	Sample 1	Sample 2
Dissolved oxygen (mg/l)	7.8	7.8
pH (standard units)	7.8	7.8
Alkalinity (mg/l as CaCO3)	56	53
Hardness (mg/l as CaCO3)	45	43
Conductivity (umhos/cm)	470	480
Residual Chlorine (mg/l)	0.070	0.090

2. Dilution Water Samples: Synthetic Soft Water #4271
   a. Dates Collected/Prepared: November 6 through November 20, 2015
   b. Chemical Data:

Analysis	Sample 1	Sample 2
Dissolved oxygen (mg/l)	8.0	7.9
pH (standard units)	7.7	7.9
Alkalinity (mg/l as CaCO3)	31	31
Hardness (mg/l as CaCO3)	41	43
Conductivity (umhos/cm)	140	150
Residual Chlorine (mg/l)	<0.05	<0.05

C. Test Methods
1. Methods for Measuring the Acute Toxicity of Effluents to Freshwater and Marine Organisms, (Fifth Ed.), EPA-821-R-02-012, 48-hour acute definitive test.
   a. Endpoints:
      Death; the criteria employed to establish death are:
      i. No movement
      ii. No reaction to gentle prodding

Criteria	*Pimephales promelas*	*Daphnia pulex*
Type and Volume of Test Chamber	500 ml disposable beaker	30 ml disposable beaker
Volume of Sample	250 ml	25 ml
Organisms per chamber	8	8
Replicates per dilution	5	5
Test Temperature	25 deg. C	25 deg. C
Test Initiated	November 11, 2015 at 1710	November 11, 2015 at 1730
Test Terminated	November 13, 2015 at 1555	November 13, 2015 at 1540
Feeding	None required	None required
Age of Test Organisms	3 days	<24 hours

2. Chemical Methods Employed:

Analysis	Method
Dissolved oxygen (mg/l)	SM 4500-O C
pH (standard units)	SM 4500-H+ B
Alkalinity (mg/l as CaCO3)	SM 2320 B
Hardness (mg/l as CaCO3)	EPA 200.7
Conductivity (umhos/cm)	EPA 120.1
Residual Chlorine (mg/l)	SM 4500-CL- F
Temperature (deg.C)	EPA 170.1

D. Test Organisms
1. Scientific Name
Daphnia pulex
Pimephales promelas

2. Acclimation of test organisms:
Daphnia pulex
Organisms were obtained from in-house cultures. The organisms were raised in moderately hard reconstituted water.
Pimephales promelas
Organisms were obtained from in-house cultures. The organisms were raised in moderately hard reconstituted water.

E. Quality Assurance
1. Toxicity Tests
a. Reference Toxicant: Sodium Chloride
b. Date of test:
Daphnia pulex: October 21, 2015 at 1420 to October 23, 2015 at 1520
Pimephales promelas: October 21, 2015 at 1400 to October 23, 2015 at 1200
c. Synthetic moderately hard dilution water used

Organism	LC50	Warning Limits
Daphnia pulex	1.58 g/l	1.32-2.58 g/l
Pimephales promelas	7.88 g/l	5.28-8.95 g/l

2. Chemical and Physical Analyses

Analysis	% Recovery	Relative % Difference
Alkalinity	NA	0.854
Hardness	100	2.28
pH	100	0.672
Conductivity	96.6	1.40

F. Organism History
Daphnia pulex
Date: November 11, 2015 at 1730
Age: <24 hours
Source: In-house culture
Water Chemistry Record:
Alkalinity: 57-64 mg/l
Hardness: 80-100 mg/l
Temperature: 25 deg.C
Pimephales promelas (Fathead minnow)
Date: November 11, 2015 at 1710
Age: 3 days
Source: In-house culture
Water Chemistry Record:
Alkalinity: 57-64 mg/l
Hardness: 80-100 mg/l
Temperature: 25 deg.C

IV. Results Summary

Daphnia pulex and *Pimephales promelas* are exposed in a static renewal system to different concentrations of effluent and dilution water. Effluent dilutions for this test were 7%, 10%, 13%, 17%, 23%. The low-flow concentration was 23%. Test results were based on survival.

Daphnia pulex

The *Daphnia pulex* test was conducted from November 11, 2015 at 1730 to November 13, 2015 at 1540.

Statistical analyses:

NOEC = <7%
LC50 = 7.95%

Concentration	24 hour % Survival	48 hour % Survival	
Control	100	100	
7%	100	75.0	*
10%	100	5.00	*
13%	100	5.00	*
17%	100	0.00	*
23%	100	0.00	*

*Significant difference compared to the control (p=0.05)

Pimephales promelas

The *Pimephales promelas* test was conducted from November 11, 2015 at 1710 to November 13, 2015 at 1555.

Statistical analyses:

NOEC = 23%
LC50 = >23%

Concentration	24 hour % Survival	48 hour % Survival
Control	100	100
7%	100	100
10%	95.0	95.0
13%	100	100
17%	100	100
23%	100	100

Appendix: A1

Daphnia pulex
Survival Data

Number of organisms per chamber: 8
Volume of test chamber: 30 ml

Age of organisms: <24 hours
Volume of test solution: 25 ml

Effluent Concentration		Number of Survivors 24 Hours	Number of Survivors 48 Hours	% Survival	CV %
Control	rep. A	8	8	100	0.00
	rep. B	8	8		
	rep. C	8	8		
	rep. D	8	8		
	rep. E	8	8		
7%	rep. A	8	6	75.0	11.8
	rep. B	8	6		
	rep. C	8	5		
	rep. D	8	7		
	rep. E	8	6		
10%	rep. A	8	0	5.00	137
	rep. B	8	0		
	rep. C	8	0		
	rep. D	8	1		
	rep. E	8	1		
13%	rep. A	8	0	5.00	224
	rep. B	8	0		
	rep. C	8	0		
	rep. D	8	0		
	rep. E	8	2		
17%	rep. A	8	0	0.00	0.00
	rep. B	8	0		
	rep. C	8	0		
	rep. D	8	0		
	rep. E	8	0		
23%	rep. A	8	0	0.00	0.00
	rep. B	8	0		
	rep. C	8	0		
	rep. D	8	0		
	rep. E	8	0		

CV = Coefficient of variance = standard deviation X 100/mean

Appendix: A1

Pimephales promelas
Survival Data

Number of organisms per chamber: 8
Volume of test chamber: 500 ml

Age of organisms: 3 days
Volume of test solution: 250 ml

Effluent Concentration		Number of Survivors 24 Hours	Number of Survivors 48 Hours	% Survival	CV %
Control	rep. A	8	8	100	0.00
	rep. B	8	8		
	rep. C	8	8		
	rep. D	8	8		
	rep. E	8	8		
7%	rep. A	8	8	100	0.00
	rep. B	8	8		
	rep. C	8	8		
	rep. D	8	8		
	rep. E	8	8		
10%	rep. A	8	8	95.0	11.8
	rep. B	8	8		
	rep. C	8	8		
	rep. D	6	6		
	rep. E	8	8		
13%	rep. A	8	8	100	0.00
	rep. B	8	8		
	rep. C	8	8		
	rep. D	8	8		
	rep. E	8	8		
17%	rep. A	8	8	100	0.00
	rep. B	8	8		
	rep. C	8	8		
	rep. D	8	8		
	rep. E	8	8		
23%	rep. A	8	8	100	0.00
	rep. B	8	8		
	rep. C	8	8		
	rep. D	8	8		
	rep. E	8	8		

CV = Coefficient of variance = standard deviation X 100/mean

Appendix A2: Statistics

Daphnia pulex

Transformation of Data				Transform: Arc Sin(Square Root(Y))
Group	Identification	Rep	Value	Transformed
1	Control	1	1.00000	1.39310
1	Control	2	1.00000	1.39310
1	Control	3	1.00000	1.39310
1	Control	4	1.00000	1.39310
1	Control	5	1.00000	1.39310
2	7%	1	0.75000	1.04720
2	7%	2	0.75000	1.04720
2	7%	3	0.62500	0.91174
2	7%	4	0.87500	1.20940
2	7%	5	0.75000	1.04720
3	10%	1	0.00000	0.17771
3	10%	2	0.00000	0.17771
3	10%	3	0.00000	0.17771
3	10%	4	0.12500	0.36137
3	10%	5	0.12500	0.36137
4	13%	1	0.00000	0.17771
4	13%	2	0.00000	0.17771
4	13%	3	0.00000	0.17771
4	13%	4	0.00000	0.17771
4	13%	5	0.25000	0.52360
5	17%	1	0.00000	0.17771
5	17%	2	0.00000	0.17771
5	17%	3	0.00000	0.17771
5	17%	4	0.00000	0.17771
5	17%	5	0.00000	0.17771
6	23%	1	0.00000	0.17771
6	23%	2	0.00000	0.17771
6	23%	3	0.00000	0.17771
6	23%	4	0.00000	0.17771
6	23%	5	0.00000	0.17771

Appendix A2: Statistics

Daphnia pulex

Shapiro - Wilk's Test for Normality	Transform: Arc Sin(Square Root(Y))
D = 0.1807	
W = 0.7756	
Critical W = 0.9	(alpha = 0.01, N = 30)
Critical W = 0.927	(alpha = 0.05, N = 30)
Data FAIL normality test (alpha = 0.01).	

Steel's Many-One Rank Test					Transform: Arc Sin(Square Root(Y))
Ho:Control<Treatment					
Group	Identification	Rank Sum	Critical Value	DF	Sig 0.05
1	Control				
2	7%	15.00	16.00	5.00	*
3	10%	15.00	16.00	5.00	*
4	13%	15.00	16.00	5.00	*
5	17%	15.00	16.00	5.00	*
6	23%	15.00	16.00	5.00	*
Critical values are 1 tailed (k=5)					

Appendix A2: Statistics

Daphnia pulex

Trimmed Spearman-Karber Method for Calculating LC50 Values

Concentration	Exposed	Responding
Control	40	0
7	40	10
10	40	38
13	40	38
17	40	40
23	40	40

Spearman-Karber Trim (Calculated) 25 %

LC50 = 7.951
Upper Confidence Limit = 8.085
Lower Confidence Limit = 7.819

Appendix A2: Statistics

Pimephales promelas

		Transformation of Data		Transform: Arc Sin(Square Root(Y))
Group	Identification	Rep	Value	Transformed
1	Control	1	1.00000	1.39310
1	Control	2	1.00000	1.39310
1	Control	3	1.00000	1.39310
1	Control	4	1.00000	1.39310
1	Control	5	1.00000	1.39310
2	7%	1	1.00000	1.39310
2	7%	2	1.00000	1.39310
2	7%	3	1.00000	1.39310
2	7%	4	1.00000	1.39310
2	7%	5	1.00000	1.39310
3	10%	1	1.00000	1.39310
3	10%	2	1.00000	1.39310
3	10%	3	1.00000	1.39310
3	10%	4	0.75000	1.04720
3	10%	5	1.00000	1.39310
4	13%	1	1.00000	1.39310
4	13%	2	1.00000	1.39310
4	13%	3	1.00000	1.39310
4	13%	4	1.00000	1.39310
4	13%	5	1.00000	1.39310
5	17%	1	1.00000	1.39310
5	17%	2	1.00000	1.39310
5	17%	3	1.00000	1.39310
5	17%	4	1.00000	1.39310
5	17%	5	1.00000	1.39310
6	23%	1	1.00000	1.39310
6	23%	2	1.00000	1.39310
6	23%	3	1.00000	1.39310
6	23%	4	1.00000	1.39310
6	23%	5	1.00000	1.39310

Appendix A2: Statistics

Pimephales promelas

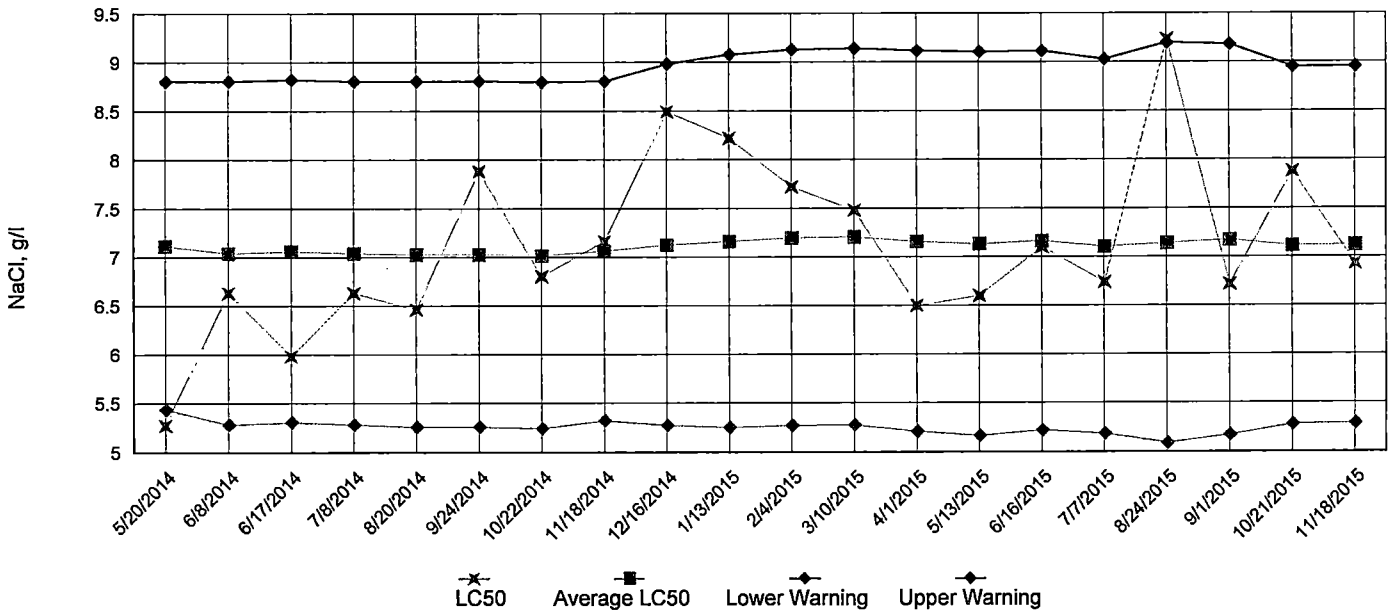
Shapiro - Wilk's Test for Normality	Transform: Arc Sin(Square Root(Y))
D = 0.09572	
W = 0.4161	
Critical W = 0.9	(alpha = 0.01, N = 30)
Critical W = 0.927	(alpha = 0.05, N = 30)
Data FAIL normality test (alpha = 0.01).	

Steel's Many-One Rank Test				Transform: Arc Sin(Square Root(Y))	
Ho:Control<Treatment					
Group	Identification	Rank Sum	Critical Value	DF	Sig 0.05
1	Control				
2	7%	27.50	16.00	5.00	
3	10%	25.00	16.00	5.00	
4	13%	27.50	16.00	5.00	
5	17%	27.50	16.00	5.00	
6	23%	27.50	16.00	5.00	
Critical values are 1 tailed (k=5)					

Appendix: A3

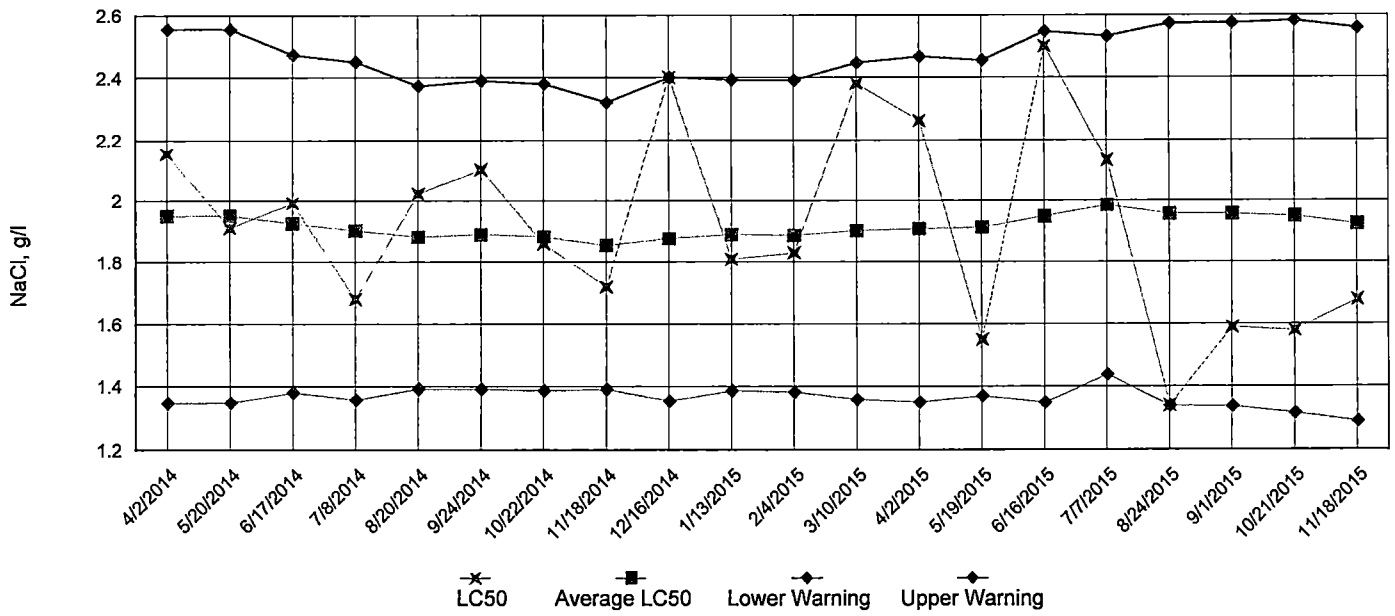
Acute Reference Toxicant, *Pimephales promelas* (Fathead Minnow)

LC50 Survival Data



Acute Reference Toxicant, *Daphnia pulex*

LC50 Survival Data



Appendix: A4

Chemical Data for
Pimephales promelas
and
Daphnia pulex

Day 1		Control	7%	10%	13%	17%	23%
DO, mg/l	Initial	8.0	8.1	8.2	8.0	7.9	7.9
DO, mg/l	Final 1*	7.4	8.2	8.2	8.5	8.4	8.0
DO, mg/l	Final 2*	7.7	7.7	7.6	7.5	7.5	8.0
pH, su	Initial	7.7	7.7	7.7	7.8	7.8	7.8
pH, su	Final 1*	7.4	7.6	7.6	7.6	7.6	7.7
pH, su	Final 2*	7.9	7.7	7.5	7.5	7.5	7.5
Alkalinity, mg/l		31	NA	NA	NA	37	NA
Hardness, mg/l		41	NA	NA	NA	42	NA
Conductivity, umho/cm		140	160	160	180	190	200
Residual Chlorine, mg/l		<0.05	NA	NA	NA	<0.05	NA

Day 2		Control	7%	10%	13%	17%	23%
DO, mg/l	Initial	7.9	8.0	8.0	8.3	7.9	7.9
DO, mg/l	Final 1*	6.7	7.9	8.0	8.2	8.0	7.8
DO, mg/l	Final 2*	7.8	7.9	7.8	8.0	7.7	7.8
pH, su	Initial	7.9	7.8	7.8	7.7	7.7	7.8
pH, su	Final 1*	7.1	7.4	7.4	7.4	7.4	7.3
pH, su	Final 2*	7.7	7.6	7.6	7.6	7.6	7.6
Alkalinity, mg/l		31	NA	NA	NA	38	NA
Hardness, mg/l		43	NA	NA	NA	43	NA
Conductivity, umho/cm		150	160	170	180	200	210
Residual Chlorine, mg/l		<0.05	NA	NA	NA	<0.05	NA

*1 data from *Pimephales promelas*
*2 data from *Daphnia pulex*

Appendix: B

Daphnia pulex Survival Data

Permitee: El Dorado Chemical Company
NPDES No: AR0000752
Contact: Mr. Eddie Pearson
Test Type: 48-hour renewal definitive toxicity test
Dilution Water: Synthetic Soft Water #4271
Test Initiated: November 11, 2015 at 1730
Test Terminated: November 13, 2015 at 1540

Critical Dilution: 23%
Sample Source: Outfall 010
Species Age: <24 hours
Analysts: 280, 304, 310, 314

PERCENT SURVIVAL

24 hours	Control	7%	10%	13%	17%	23%
Rep. A	100	100	100	100	100	100
Rep. B	100	100	100	100	100	100
Rep. C	100	100	100	100	100	100
Rep. D	100	100	100	100	100	100
Rep. E	100	100	100	100	100	100

48 hours	Control	7%	10%	13%	17%	23%
Rep. A	100	75.0	0.00	0.00	0.00	0.00
Rep. B	100	75.0	0.00	0.00	0.00	0.00
Rep. C	100	62.5	0.00	0.00	0.00	0.00
Rep. D	100	87.5	12.5	0.00	0.00	0.00
Rep. E	100	75.0	12.5	25.0	0.00	0.00

Dunnett's Procedure or Steel's Many-One Rank Test as appropriate. Is the mean survival at 48 hours significantly different (p=0.05) than the control survival for the % effluent corresponding to:

a) Low Flow 23%: X Yes _____ No
b) 1/2 Low Flow (NA): _____ Yes _____ No

Pass/Fail #TEM3D. 1

NOEL *Daphnia pulex* lethality #TOM3D: <7%

Coefficient of variation for *Daphnia pulex* survival #TQM3D: 0

Enter percent effluent corresponding to LC-50 below.

LC-50 effluent: 7.95%
95% Confidence Limits: 7.819% to 8.085%
Method of LC-50 calculation: Trimmed Spearman-Karber

Reference Toxicity Test Performed on October 21, 2015 at 1420 to October 23, 2015 at 1520:

LC-50 effluent: 1.58 g/l
Warning Limits: 1.32 to 2.58 g/l

Appendix: B

Daphnia pulex Chemical Parameters Chart

Permitee: El Dorado Chemical Company
NPDES No: AR0000752
Contact: Mr. Eddie Pearson
Test Type: 48-hour renewal definitive toxicity test
Dilution Water: Synthetic Soft Water #4271
Test Initiated: November 11, 2015 at 1730
Test Terminated: November 13, 2015 at 1540

Critical Dilution: 23%
Sample Source: Outfall 010
Species Age: <24 hours
Analysts: 280, 304, 310, 314

Day 1		Control	7%	10%	13%	17%	23%
DO, mg/l	Initial	8.0	8.1	8.2	8.0	7.9	7.9
DO, mg/l	Final	7.7	7.7	7.6	7.5	7.5	8.0
pH, su	Initial	7.7	7.7	7.7	7.8	7.8	7.8
pH, su	Final	7.9	7.7	7.5	7.5	7.5	7.5
Alkalinity, mg/l		31	NA	NA	NA	37	NA
Hardness, mg/l		41	NA	NA	NA	42	NA
Conductivity, umho/cm		140	160	160	180	190	200
Residual Chlorine, mg/l		<0.05	NA	NA	NA	<0.05	NA

Day 2		Control	7%	10%	13%	17%	23%
DO, mg/l	Initial	7.9	8.0	8.0	8.3	7.9	7.9
DO, mg/l	Final	7.8	7.9	7.8	8.0	7.7	7.8
pH, su	Initial	7.9	7.8	7.8	7.7	7.7	7.8
pH, su	Final	7.7	7.6	7.6	7.6	7.6	7.6
Alkalinity, mg/l		31	NA	NA	NA	38	NA
Hardness, mg/l		43	NA	NA	NA	43	NA
Conductivity, umho/cm		150	160	170	180	200	210
Residual Chlorine, mg/l		<0.05	NA	NA	NA	<0.05	NA

Appendix: B

Pimephales promelas Survival Data

Permitee:	El Dorado Chemical Company	Critical Dilution:	23%
NPDES No:	AR0000752	Sample Source:	Outfall 010
Contact:	Mr. Eddie Pearson	Species Age:	3 days
Test Type:	48-hour renewal definitive toxicity test	Analysts:	280, 304, 310, 314
Dilution Water:	Synthetic Soft Water #4271		
Test Initiated:	November 11, 2015 at 1710		
Test Terminated:	November 13, 2015 at 1555		

PERCENT SURVIVAL

24 hours	Control	7%	10%	13%	17%	23%
Rep. A	100	100	100	100	100	100
Rep. B	100	100	100	100	100	100
Rep. C	100	100	100	100	100	100
Rep. D	100	100	75.0	100	100	100
Rep. E	100	100	100	100	100	100

48 hours	Control	7%	10%	13%	17%	23%
Rep. A	100	100	100	100	100	100
Rep. B	100	100	100	100	100	100
Rep. C	100	100	100	100	100	100
Rep. D	100	100	75.0	100	100	100
Rep. E	100	100	100	100	100	100

Dunnett's Procedure or Steel's Many-One Rank Test as appropriate. Is the mean survival at 48 hours significantly different (p=0.05) than the control survival for the % effluent corresponding to:

a) Low Flow 23%: _____ Yes X No
b) 1/2 Low Flow (NA): _____ Yes _____ No

Pass/Fail #TEM6C. 0

NOEL *Pimephales promelas* lethality #TOM6C: 23%

Coefficient of variation for *Pimephales promelas* survival #TQM6C: 0

Enter percent effluent corresponding to LC-50 below.

LC-50 effluent: >23%
Method of LC-50 calculation: NA

Reference Toxicity Test Performed on October 21, 2015 at 1400 to October 23, 2015 at 1200:

LC-50 effluent: 7.88 g/l
Warning Limits: 5.28 to 8.95 g/l

Appendix: B

Pimephales promelas Chemical Parameters Chart

Permitee: El Dorado Chemical Company
NPDES No: AR0000752
Contact: Mr. Eddie Pearson
Test Type: 48-hour renewal definitive toxicity test
Dilution Water: Synthetic Soft Water #4271
Test Initiated: November 11, 2015 at 1710
Test Terminated: November 13, 2015 at 1555

Critical Dilution: 23%
Sample Source: Outfall 010
Species Age: 3 days
Analysts: 280, 304, 310, 314

Day 1		Control	7%	10%	13%	17%	23%
DO, mg/l	Initial	8.0	8.1	8.2	8.0	7.9	7.9
DO, mg/l	Final	7.4	8.2	8.2	8.5	8.4	8.0
pH, su	Initial	7.7	7.7	7.7	7.8	7.8	7.8
pH, su	Final	7.4	7.6	7.6	7.6	7.6	7.7
Alkalinity, mg/l		31	NA	NA	NA	37	NA
Hardness, mg/l		41	NA	NA	NA	42	NA
Conductivity, umho/cm		140	160	160	180	190	200
Residual Chlorine, mg/l		<0.05	NA	NA	NA	<0.05	NA

Day 2		Control	7%	10%	13%	17%	23%
DO, mg/l	Initial	7.9	8.0	8.0	8.3	7.9	7.9
DO, mg/l	Final	6.7	7.9	8.0	8.2	8.0	7.8
pH, su	Initial	7.9	7.8	7.8	7.7	7.7	7.8
pH, su	Final	7.1	7.4	7.4	7.4	7.4	7.3
Alkalinity, mg/l		31	NA	NA	NA	38	NA
Hardness, mg/l		43	NA	NA	NA	43	NA
Conductivity, umho/cm		150	160	170	180	200	210
Residual Chlorine, mg/l		<0.05	NA	NA	NA	<0.05	NA

AMERICAN INTERPLEX CORPORATION LABORATORIES

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: El Dorado Chemical Co

Project Reference: AR 0000752

Project Manager: Edward L Pearson

Sampled By: Edward L Pearson

PO No.:

AIC CONTROL NO: 196142

AIC PROPOSAL NO:

Carrier:

Received Temperature C: 0.1

AIC No.	Sample Identification	Date/Time Collected	GRAB	COMP	WATER	SOIL		NO OF BOTTLES	Bio Acute monitoring Daphnia minnow											Remarks
1	010	11-11-15 1000		X	X			3	X											
																				Field pH calibration
		Container Type																		on ________ @ ______
		Preservative																		Buffer:

G = Glass | P = Plastic | V = VOA vials | H = HCl to pH2 | T = Sodium Thiosulfate
NO = none | S = Sulfuric acid pH2 | N = Nitric acid pH2 | B = NaOH to pH12 | Z = Zinc acetate | A=$(NH_4)_2SO_4$, NH_4OH

Turnaround Time Requested: (Please circle)
NORMAL (circled) or EXPEDITED IN ____ DAYS
Expedited results requested by: ____________________
Who should AIC contact with questions:
Phone:__________ Fax:
Report Attention to:
Report Address to:

Email Address:

Relinquished By:	Date/Time	Received By:	Date/Time
Edward L Pearson (signature)	10-11-15 1200		
Relinquished By:	Date/Time	Received in Lab By:	Date/Time
		(signature)	11/11/15 1450

Comments:

AMERICAN INTERPLEX CORPORATION LABORATORIES

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client:	El Dorado Chemical Co
Project Reference:	AR0000752 Outfall 010
Project Manager:	Edward L Pearson
Sampled By:	Edward L Pearson
PO No.	
AIC CONTROL NO:	196142
AIC PROPOSAL NO:	
Carrier:	RUSH
Received Temperature C	0.1

ANALYSES REQUESTED: Acute Bio Monitoring — Daphnia Minnow

AIC No.	Sample Identification	Date/Time Collected	GRAB	COMP	MATRIX WATER	MATRIX SOIL		NO OF BOTTLES	Acute Bio Monitoring Daphnia Minnow	Remarks
2	Outfall 010	11-12-15 1015		X	X			3	X	
										Field pH calibration
		Container Type							P	on ________ @ ______
		Preservative							ND	Buffer:

G = Glass P = Plastic V = VOA vials H = HCl to pH2 T = Sodium Thiosulfate
NO = none S = Sulfuric acid pH2 N = Nitric acid pH2 B = NaOH to pH12 Z = Zinc acetate A=$(NH_4)_2SO_4$, NH_4OH

Turnaround Time Requested: (Please circle)
(NORMAL) or EXPEDITED IN ____ DAYS
Expedited results requested by: ______________________
Who should AIC contact with questions:
Phone:__________ Fax:
Report Attention to:
Report Address to:

Email Address:

Relinquished By:	Date/Time	Received By:	Date/Time
Edward L Pearson	11-12-15 1200		
Relinquished By:	Date/Time	Received in Lab By:	Date/Time
		D. Br[illegible]	11-12-15 1420

Comments:

After printing this label:
1. Use the 'Print' button on this page to print your label to your laser or inkjet printer.
2. Fold the printed page along the horizontal line.
3. Place label in shipping pouch and affix it to your shipment so that the barcode portion of the label can be read and scanned.

Warning: Use only the printed original label for shipping. Using a photocopy of this label for shipping purposes is fraudulent and could result in additional billing charges, along with the cancellation of your FedEx account number.
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