

July 19, 2012

Test Results of
Third Quarter
Chronic 7-Day Renewal
Biomonitoring Testing
for
Outfall 001
South Effluent

Control No. 159195-1

Prepared for:

Mr. Harold Baker
El Dorado Water Utilities
Post Office Box 1587
El Dorado, AR 71731

Prepared by:

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

El Dorado Water Utilities
ATTN: Mr. Harold Baker
Post Office Box 1587
El Dorado, AR 71731

Re: Chronic 7-Day Renewal utilizing *Pimephales promelas* (Fathead minnow) and *Ceriodaphnia dubia*
Outfall 001 - South Effluent
NPDES Permit No. AR0033723 AFIN No. 70-00341

Dear Mr. Harold Baker:

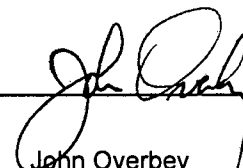
This report is the analytical results and supporting information for the samples submitted to American Interplex Corporation (AIC). The following results are applicable only to the sample identified by the control number referenced above. Accurate assessment of the data requires access to the entire 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 75 % effluent, which is below the critical dilution of 100 %. The NOEC for growth occurred at 75 % effluent, which is below the critical dilution of 100 %. **The sample, therefore, FAILED 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 100 % effluent, which is equal to the critical dilution of 100 %. The NOEC for reproduction occurred at 100 % effluent, which is equal to the critical dilution of 100 %. **The sample, therefore, PASSED both lethal and sub-lethal effects for the *Ceriodaphnia dubia* test.**

AMERICAN INTERPLEX CORPORATION



John Overbey
Laboratory Director

PDF cc: El Dorado Water Utilities
ATTN: Mr. Harold Baker
harold@eldoradowater.com

El Dorado Water Utilities
ATTN: Mr. John Peppers
lab@eldoradowater.com

GBMc & Associates, Inc.
ATTN: Mr. Roland McDaniel
rmcdaniel@gbmcassoc.com

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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	0.424	PASS
Control Growth CV < or = 40%	7.83	PASS
Growth Minimum Significant Difference 12 to 30%	16.7	PASS
Critical Dilution CV < or = 40%	38.2	PASS

Ceriodaphnia dubia Method 1002.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	100	PASS
Control Reproduction > or = 15 per Surviving Female	19.0	PASS
Control CV < or = 40% per Surviving Female	14.5	PASS
Reproduction Minimum Significant Difference 13 to 47%	19.7	PASS
Critical Dilution CV < or = 40%	21.2	PASS

II. Outlined Report

A. Introduction

1. Permit Number: AR0033723 AFIN No. 70-00341
2. Test Requirements: Chronic Biomonitoring, Quarterly Test Methods 1000.0 and 1002.0
3. Receiving Stream: Bayou de Loutre

B. Source of Effluent/Dilution Water

1. Effluent Samples:

- a. Sampling Point: Outfall 001
- b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	8.0	7.5	8.4
pH (standard units)	6.8	7.1	6.7
Alkalinity (mg/l as CaCO ₃)	36	29	29
Hardness (mg/l as CaCO ₃)	8.7	7.6	9.1
Conductivity (umhos/cm)	560	540	470
Residual Chlorine (mg/l)	<0.05	<0.05	<0.05
Ammonia as N (mg/l)	1.1	0.70	1.5

2. Dilution Water Samples: Synthetic Laboratory Soft Water #3889

- a. Dates Prepared: June 29 through July 13, 2012
- b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	7.9	8.0	8.0
pH (standard units)	7.4	7.4	7.9
Alkalinity (mg/l as CaCO ₃)	30	30	30
Hardness (mg/l as CaCO ₃)	46	44	44
Conductivity (umhos/cm)	100	96	80
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: July 10, 2012 at 1215
Date & Time Test Terminated: July 17, 2012 at 1025
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: July 10, 2012 at 1415
Date & Time Test Terminated: July 17, 2012 at 1400
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 Bartlett's test and analyzed with Dunnett's Test to determine the No Observable Effects Concentration (NOEC) for Reproduction.

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 July 10, 2012 at 1515 to July 17, 2012 at 1320

The results were as follows: (Control No. 159240-2.)

Survival LC-50: 5830 mg/l

Growth IC-25: 4405 mg/l

Growth PMSD: 24

Ceriodaphnia dubia

Chronic reference tests are performed monthly.

A chronic reference test was performed on July 10, 2012 at 1350 to July 16, 2012 at 1335

The results were as follows: (Control No. 159240-1.)

Survival LC-50: 2125 mg/l

Growth IC-25: 1433 mg/l

Growth PMSD: 21.8

V. Chemical Analysis/Quality Control

Parameter	Method	% Recovery	Relative % Difference
Alkalinity	SM 2320 B	NA	0.00
Hardness	EPA 200.7	97.2	3.16
pH	SM 4500-H+ B	101	0.402
Conductivity	EPA 120.1	94.1	0.580

VI. Organism History

Pimephales promelas (Fathead minnow)

Date: July 10, 2012

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: July 10, 2012

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

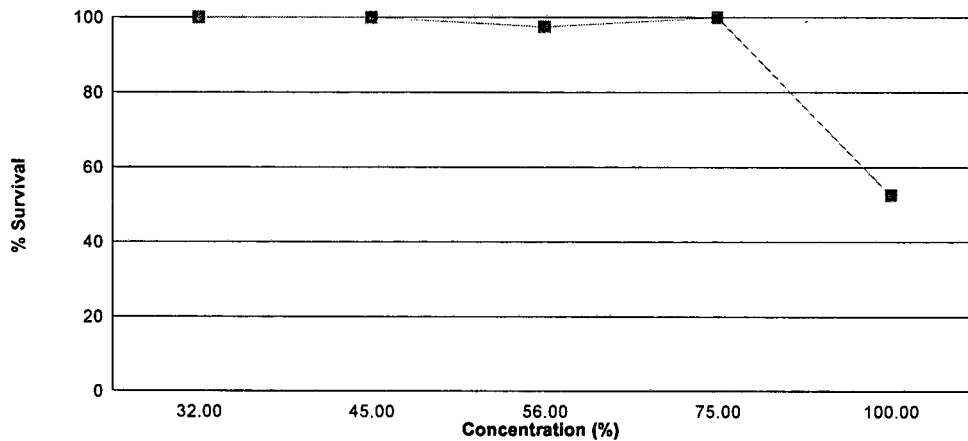
Larvae are exposed in a static renewal system for seven days to different concentrations of effluent with dilution water. Test results are based on the survival and growth (increase in weight) of the larvae.

Effluent dilutions for this test were 32 %, 45 %, 56 %, 75 %, 100 % in accordance with the NPDES permit.

The low flow or 'critical' dilution is specified in the NPDES permit as 100 % effluent.

The test was initiated on July 10, 2012 at 1215 and continued through July 17, 2012 at 1025. Statistical analyses were performed on the observed data and the no observable effects concentrations (NOECs) were as follows:

- a.) NOEC survival = 75 % effluent
- b.) NOEC growth = 75 % effluent



Summary of the 7-day Fathead Minnow Survival and Growth		
Concentration	Percent Survival	Mean Growth (mg)
Control	100	0.424
32 %	100	0.449
45 %	100	0.459
56 %	97.5	0.449
75 %	100	0.411
100 %	52.5 *	--

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

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

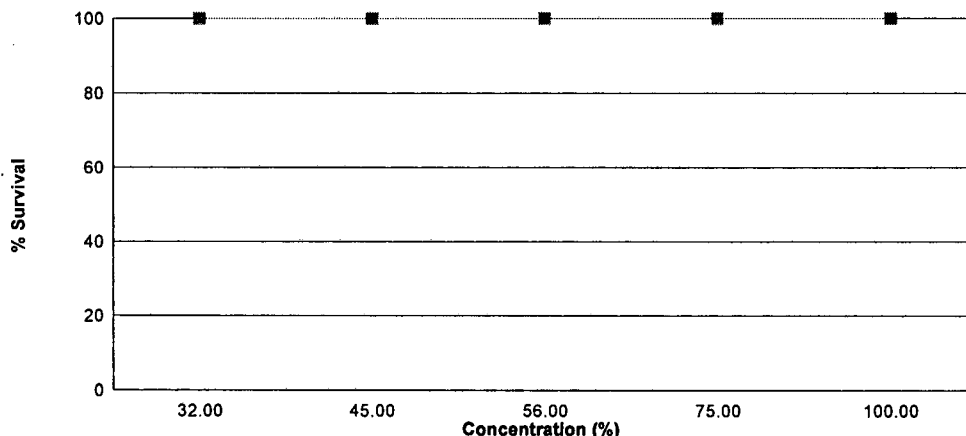
Neonates are exposed in a static renewal system to different concentrations of effluent with dilution water until 60% of surviving control organisms have three broods of offspring with an average of at least 15 young per female.

Effluent dilutions for this test were 32 %, 45 %, 56 %, 75 %, 100 % in accordance with the NPDES permit.

The low flow or 'critical' dilution is specified in the NPDES permit as 100 % effluent.

The test was initiated on July 10, 2012 at 1415 and continued through July 17, 2012 at 1400. Statistical analyses were performed on the observed data and the no observable effects concentrations (NOECs) were as follows:

- a.) NOEC survival = 100 % effluent
- b.) NOEC reproduction = 100 % effluent



Summary of the 7-day <i>Ceriodaphnia dubia</i> Survival and Reproduction Data		
Concentration	Percent Survival	Mean Reproduction
Control	100	19.0
32 %	100	22.9
45 %	100	22.4
56 %	100	23.3
75 %	100	21.4
100 %	100	16.4

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Survival

Date and Time Test Initiated: July 10, 2012 at 1215

Date and Time Test Terminated: July 17, 2012 at 1025

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
32 %	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
45 %	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
56 %	A	8	8	7	7	7	7	7
	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
75 %	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
100 %	A	8	7	6	6	6	6	6
	B	5	5	4	4	4	4	4
	C	6	4	4	4	4	4	4
	D	7	6	3	2	2	2	2
	E	7	7	6	5	5	5	5

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Growth

Test Initiated: July 10, 2012 at 1215
Test Terminated: July 17, 2012 at 1025

Drying Started: July 16, 2012 at 1555
Drying Ended: July 18, 2012 at 1230

Concentration	Replicate	Weight of pan	Weight of pan + fish	Total weight of fish (g)	Original # of fish	Mean dry weight (mg)
Control	A	.93787	.94127	0.00340	8	0.425
	B	.93584	.93922	0.00338	8	0.422
	C	.94005	.94370	0.00365	8	0.456
	D	.93540	.93837	0.00297	8	0.371
	E	.93730	.94088	0.00358	8	0.448
32 %	A	.93686	.93965	0.00279	8	0.349
	B	.93550	.93931	0.00381	8	0.476
	C	.93660	.94034	0.00374	8	0.468
	D	.93730	.94117	0.00387	8	0.484
	E	.93787	.94163	0.00376	8	0.470
45 %	A	.93781	.94130	0.00349	8	0.436
	B	.93723	.94001	0.00278	8	0.348
	C	.93671	.94078	0.00407	8	0.509
	D	.93728	.94120	0.00392	8	0.490
	E	.93472	.93880	0.00408	8	0.510
56 %	A	.93661	.93996	0.00335	8	0.419
	B	.93618	.93983	0.00365	8	0.456
	C	.93401	.93761	0.00360	8	0.450
	D	.93218	.93565	0.00347	8	0.434
	E	.93299	.93689	0.00390	8	0.488
75 %	A	.93312	.93626	0.00314	8	0.392
	B	.93237	.93534	0.00297	8	0.371
	C	.93260	.93557	0.00297	8	0.371
	D	.93321	.93680	0.00359	8	0.449
	E	.93390	.93768	0.00378	8	0.472
100 %	A	.93350	.93529	0.00179	8	0.224
	B	.93142	.93282	0.00140	8	0.175
	C	.93113	.93232	0.00119	8	0.149
	D	.93118	.93171	0.00053	8	0.066
	E	.92895	.93066	0.00171	8	0.214

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: July 10, 2012 at 1415
Date and Time Test Terminated: July 17, 2012 at 1400

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	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	3	2	0	0	0	0	0	0	0	0	0	5	10	0.500
4	0	0	3	4	3	4	3	2	6	4	29	10	2.90	
5	5	6	7	7	8	5	4	0	2	6	50	10	5.00	
6	10	12	11	0	9	0	0	7	0	9	58	10	5.80	
7	11E	0	0	10	0	8	16	4	10	0	48	10	4.80	
8														
TOTAL	18	20	21	21	20	17	23	13	18	19	190	10	19.0	

E = Excluded fourth brood neonates

Concentration: 32 %														
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	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	2	2	0	0	0	0	0	0	0	0	4	10	0.400	
4	5	0	2	3	4	3	3	4	4	3	31	10	3.10	
5	5	9	5	10	8	6	7	4	6	6	66	10	6.60	
6	0	12	0	0	0	0	0	0	0	11	23	10	2.30	
7	15	14E	10	14	16	9	12	14	15	0	105	10	10.5	
8														
TOTAL	27	23	17	27	28	18	22	22	25	20	229	10	22.9	

E = Excluded fourth brood neonates

Concentration: 45 %														
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	0	10	0.00
2	0	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	0	10	0.00
4	4	2	4	4	4	3	4	4	0	4	33	10	3.30	
5	6	0	7	6	9	6	5	8	7	5	59	10	5.90	
6	1	12	11	0	10	0	0	0	12	11	57	10	5.70	
7	14	14	0	12	0	10	13	12	0	0	75	10	7.50	
8														
TOTAL	25	28	22	22	23	19	22	24	19	20	224	10	22.4	

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: July 10, 2012 at 1415

Date and Time Test Terminated: July 17, 2012 at 1400

Concentration: 56 %														
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	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	3	0	0	0	0	0	0	0	0	0	3	10	0.300
4	5	0	4	3	4	2	3	5	5	4	35	10	3.50	
5	5	8	6	7	0	2	8	6	0	2	44	10	4.40	
6	1	9	0	0	9	0	0	0	11	9	39	10	3.90	
7	11	12E	12	11	13	9	15	15	12	14	112	10	11.2	
8														
TOTAL	22	20	22	21	26	13	26	26	28	29	233	10	23.3	

E = Excluded fourth brood neonates

Concentration: 75 %														
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	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	2	0	0	0	0	0	0	0	0	2	10	0.200	
4	5	0	4	4	3	1	2	5	6	3	33	10	3.30	
5	6	7	8	5	4	8	7	6	8	7	66	10	6.60	
6	0	10	9	1	0	0	0	0	1	8	29	10	2.90	
7	15	0	0	10	10	10	12	13	14	0	84	10	8.40	
8														
TOTAL	26	19	21	20	17	19	21	24	29	18	214	10	21.4	

Concentration: 100 %														
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	0	10	0.00
2	0	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	0	10	0.00
4	3	2	3	2	3	3	4	3	3	2	28	10	2.80	
5	4	7	4	5	4	6	3	7	5	3	48	10	4.80	
6	0	0	0	0	4	0	0	0	1	0	5	10	0.500	
7	8	12	6	10	0	5	12	10	11	9	83	10	8.30	
8														
TOTAL	15	21	13	17	11	14	19	20	20	14	164	10	16.4	

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	32 %	1	1.00000	1.39310
2	32 %	2	1.00000	1.39310
2	32 %	3	1.00000	1.39310
2	32 %	4	1.00000	1.39310
2	32 %	5	1.00000	1.39310
3	45 %	1	1.00000	1.39310
3	45 %	2	1.00000	1.39310
3	45 %	3	1.00000	1.39310
3	45 %	4	1.00000	1.39310
3	45 %	5	1.00000	1.39310
4	56 %	1	0.87500	1.20940
4	56 %	2	1.00000	1.39310
4	56 %	3	1.00000	1.39310
4	56 %	4	1.00000	1.39310
4	56 %	5	1.00000	1.39310
5	75 %	1	1.00000	1.39310
5	75 %	2	1.00000	1.39310
5	75 %	3	1.00000	1.39310
5	75 %	4	1.00000	1.39310
5	75 %	5	1.00000	1.39310
6	100 %	1	0.75000	1.04720
6	100 %	2	0.50000	0.78540
6	100 %	3	0.50000	0.78540
6	100 %	4	0.25000	0.52360
6	100 %	5	0.62500	0.91174

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Survival

Shapiro - Wilk's Test for Normality		Transform: Arc Sin(Square Root(Y))
D = 0.1768 W = 0.6436 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	32 %	27.50	16.00	5.00	
3	45 %	27.50	16.00	5.00	
4	56 %	25.00	16.00	5.00	
5	75 %	27.50	16.00	5.00	
6	100 %	15.00	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
<p>D = 0.0475 W = 0.9185 Critical W = 0.888 (alpha = 0.01, N = 25) Critical W = 0.918 (alpha = 0.05, N = 25)</p> <p>Data PASS normality test (alpha = 0.01).</p>	

Bartlett's Test for Homogeneity of Variance	No Transformation
<p>Calculated B1 statistic = 4.104 Critical B = 13.277 (alpha = 0.01, df = 4)</p> <p>Data PASS B1 homogeneity test at 0.01 level.</p>	

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Growth

ANOVA Table				No Transformation	
SOURCE	DF	SS	MS	F	
Between	4	0.007983	0.001996	0.8404	
Within (Error)	20	0.0475	0.002375		
Total	24	0.05548			
Critical F = 4.43 (alpha = 0.01, df = 4,20)					
2.87 (alpha = 0.05, df = 4,20)					
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	0.4244	0.4244		
2	32 %	0.4494	0.4494	-0.8111	
3	45 %	0.4586	0.4586	-1.11	
4	56 %	0.4494	0.4494	-0.8111	
5	75 %	0.411	0.411	0.4348	
Dunnett's critical value = 2.3 (1 Tailed, alpha = 0.05, df = 4,20) (Actual df = 4,20)					

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	32 %	5	0.07089	16.7	-0.025	
3	45 %	5	0.07089	16.7	-0.0342	
4	56 %	5	0.07089	16.7	-0.025	
5	75 %	5	0.07089	16.7	0.0134	

Appendix A2: Statistics

Ceriodaphnia dubia Survival

Fisher's Exact Test			
Identification	Alive	Dead	Total Animals
Control	10	0	10
32 %	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
45 %	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
56 %	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
75 %	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
100 %	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.

Summary of Fisher's Exact Test				
Group	Identification	Exposed	Dead	Sig 0.05
0	Control	10	0	
1	32 %	10	0	
2	45 %	10	0	
3	56 %	10	0	
4	75 %	10	0	
5	100 %	10	0	

Appendix A2: Statistics

Ceriodaphnia dubia Reproduction

Chi-Square Test for Normality	No Transformation
Chi-Square = 3.474 Critical Chi-Square = 13.28 (alpha = 0.01, df = 4)	
Data PASS normality test (alpha = 0.01).	

Kolmogorov Test for Normality	No Transformation
D = 0.0811 D* = 0.6363 Critical D* = 1.035 (alpha = 0.01, N = 60)	
Data PASS normality test (alpha = 0.01).	

Bartlett's Test for Homogeneity of Variance	No Transformation
Calculated B1 statistic = 3.719 Critical B = 15.086 (alpha = 0.01, df = 5)	
Data PASS B1 homogeneity test at 0.01 level.	

Appendix A2: Statistics

Ceriodaphnia dubia Reproduction

ANOVA Table				No Transformation	
SOURCE	DF	SS	MS	F	
Between	5	361.2	72.24	5.481	
Within (Error)	54	711.8	13.18		
Total	59	1073			
Critical F = 3.38 (alpha = 0.01, df = 5,54)					
2.38 (alpha = 0.05, df = 5,54)					
Since F > Critical F 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	19	19			
2	32 %	22.9	22.9	-2.402		
3	45 %	22.4	22.4	-2.094		
4	56 %	23.3	23.3	-2.648		
5	75 %	21.4	21.4	-1.478		
6	100 %	16.4	16.4	1.601		
Dunnett's critical value = 2.31 (1 Tailed, alpha = 0.05, df [used] = 5,40) (Actual df = 5,54)						

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	32 %	10	3.75	19.7	-3.9		
3	45 %	10	3.75	19.7	-3.4		
4	56 %	10	3.75	19.7	-4.3		
5	75 %	10	3.75	19.7	-2.4		
6	100 %	10	3.75	19.7	2.6		

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: July 10, 2012 at 0946

Date and Time Test Terminated: July 17, 2012 at 1400

Effluent Conc.: Control	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
DO, mg/l	Initial	7.9	8.0	8.0	6.8	8.0	7.8	7.9
	Final *1	7.4	7.3	7.3	8.0	7.9	7.2	6.5
	Final *2	8.3	8.2	8.3	8.6	8.2	8.3	8.0
pH, units	Initial	7.4	7.4	7.4	8.0	7.9	7.4	7.8
	Final *1	8.2	8.2	8.2	7.8	8.5	7.6	7.4
	Final *2	8.8	8.8	8.8	8.5	8.9	8.1	8.0
Alkalinity, mg CaCO ₃ /l	30	NA	30	NA	30	NA	NA	
Hardness, mg CaCO ₃ /l	46	NA	44	NA	44	NA	NA	
Conductivity, umhos/cm	100	98	96	89	80	88	75	
Res. Chlorine, mg/l	<0.05	NA	<0.05	NA	<0.05	NA	NA	

Effluent Conc.: 32 %	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
DO, mg/l	Initial	8.0	7.8	7.8	6.6	7.9	7.8	7.9
	Final *1	7.4	7.2	7.2	8.0	7.9	7.2	5.9
	Final *2	8.4	8.3	8.4	8.4	8.2	8.4	8.0
pH, units	Initial	7.3	7.7	7.9	8.1	7.5	8.1	7.2
	Final *1	8.1	8.1	8.3	7.7	8.4	7.5	7.2
	Final *2	8.7	8.8	8.8	8.4	8.8	8.0	7.9

Effluent Conc.: 45 %	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
DO, mg/l	Initial	8.1	7.8	7.8	6.6	7.8	7.8	7.8
	Final *1	7.5	7.1	6.9	7.8	7.9	7.1	6.0
	Final *2	8.4	8.2	8.3	8.6	8.2	8.4	8.0
pH, units	Initial	7.2	7.6	7.8	8.1	7.4	8.1	7.2
	Final *1	8.1	8.1	8.3	7.6	8.4	7.5	7.2
	Final *2	8.6	8.8	8.8	8.4	8.8	8.0	7.8

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: July 10, 2012 at 0946

Date and Time Test Terminated: July 17, 2012 at 1400

Effluent Conc.: 56 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.8	7.6	7.8	6.6	8.1	7.9	7.5
	Final *1	7.2	6.9	7.0	7.8	8.0	7.4	6.2
	Final *2	8.4	8.3	8.4	8.5	8.2	8.4	7.9
pH, units	Initial	7.0	7.5	7.8	8.1	7.4	8.1	7.1
	Final *1	8.0	8.0	8.3	7.6	8.4	7.5	7.2
	Final *2	8.7	8.8	8.7	8.3	8.8	8.0	7.8

Effluent Conc.: 75 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.7	7.7	7.7	6.6	8.2	8.0	7.9
	Final *1	7.0	6.6	7.0	7.6	8.0	7.1	6.6
	Final *2	8.4	8.4	8.4	8.5	8.3	8.1	7.9
pH, units	Initial	6.9	7.4	7.7	8.1	7.2	8.0	6.9
	Final *1	7.9	7.9	8.4	7.5	8.4	7.4	7.2
	Final *2	8.6	8.7	8.6	8.3	8.7	7.9	7.8

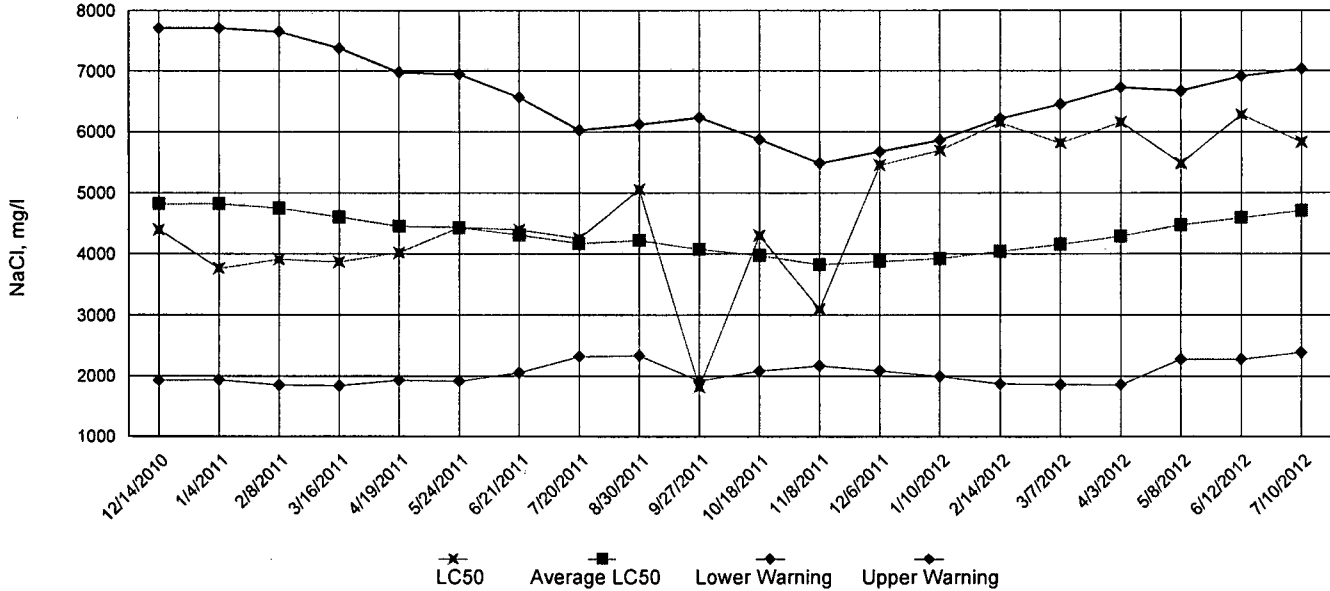
Effluent Conc.: 100 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.0	7.4	7.5	6.5	8.4	7.9	8.0
	Final *1	7.3	6.8	7.0	7.6	8.0	7.1	6.7
	Final *2	8.4	8.2	8.3	8.5	8.4	8.3	7.8
pH, units	Initial	6.8	6.8	7.1	8.2	6.7	8.0	6.6
	Final *1	7.9	7.9	8.5	7.4	8.3	7.4	7.2
	Final *2	8.5	8.6	8.6	8.0	8.7	7.9	7.7
Alkalinity, mg CaCO ₃ /l	36	NA	29	NA	29	NA	NA	NA
Hardness, mg CaCO ₃ /l	8.7	NA	7.6	NA	9.1	NA	NA	NA
Conductivity, umhos/cm	560	540	540	520	470	490	440	440
Res. Chlorine, mg/l	<0.05	NA	<0.05	NA	<0.05	NA	NA	NA

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

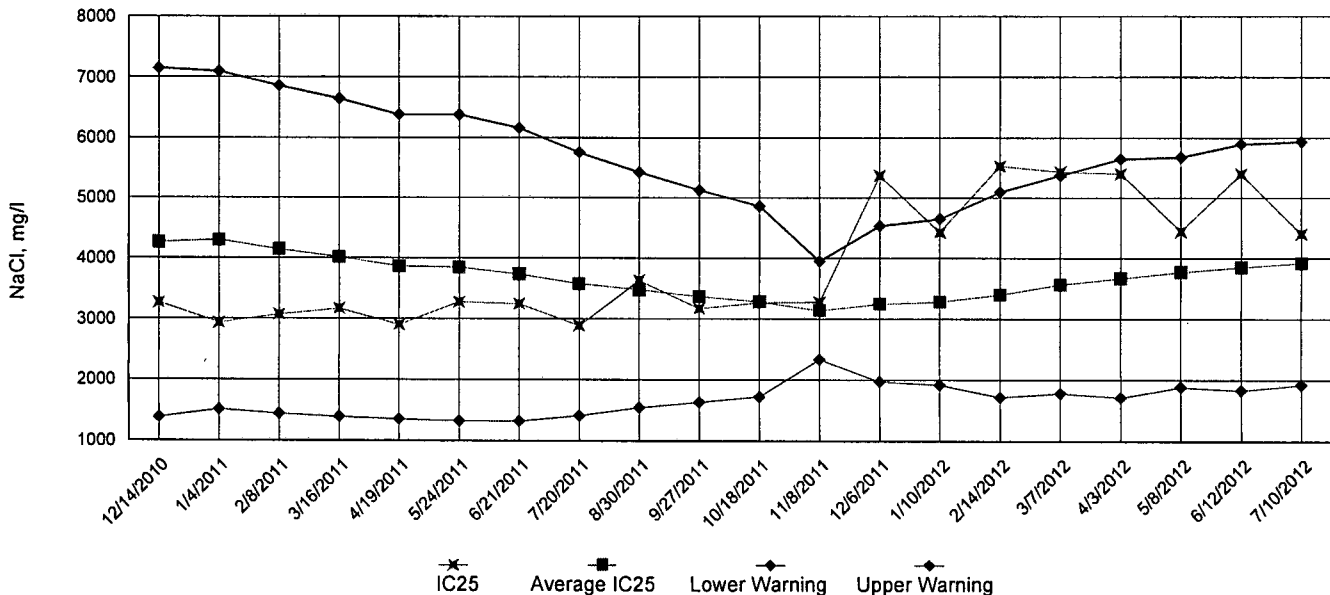
Appendix A4: Test 1000.0

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

LC50 Survival Data

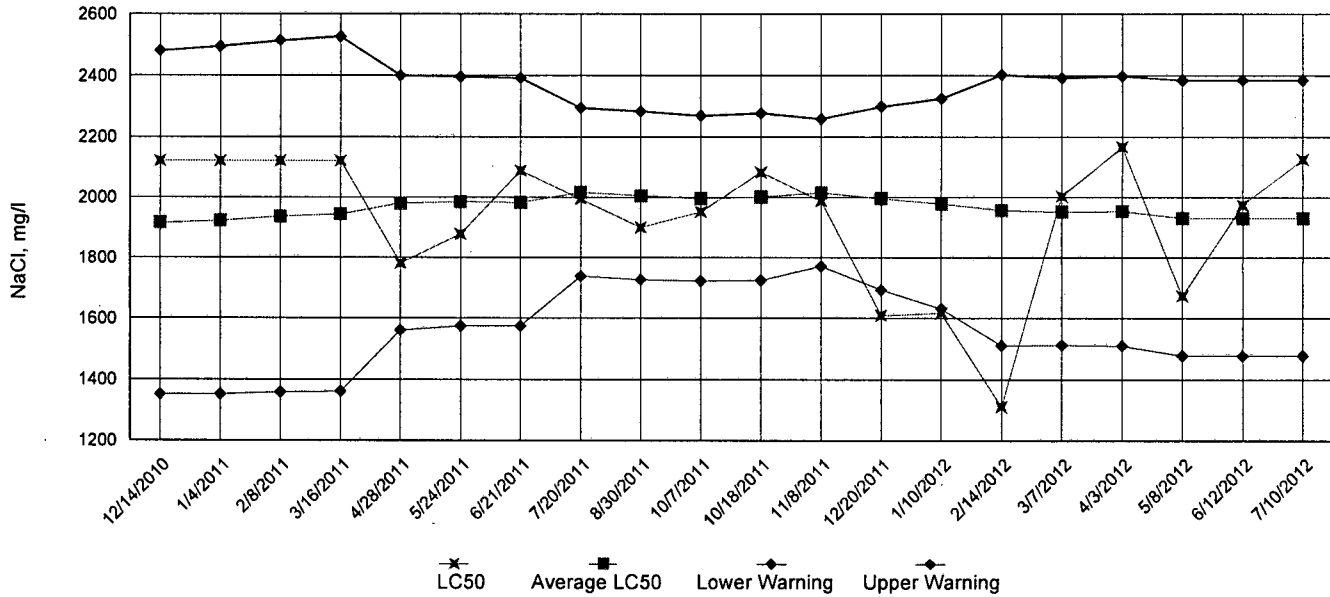


IC25 Growth Data

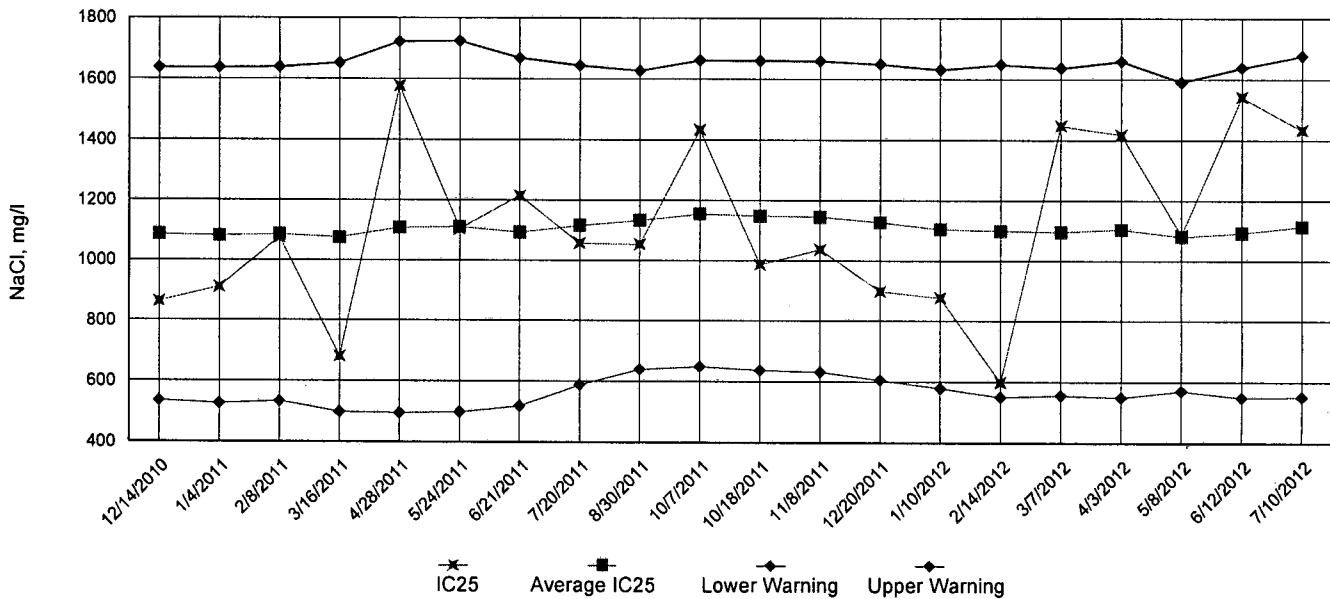


Appendix A4: Test 1002.0
Chronic Reference Toxicant, *Ceriodaphnia dubia*

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 Water Utilities

NPDES No.: AR0033723 AFIN No. 70-00341

Date and Time Test Initiated: July 10, 2012 at 1215

Date and Time Test Terminated: July 17, 2012 at 1025

Dilution water used: Synthetic Laboratory Soft Water #3889

DATA TABLE FOR SURVIVAL

Effluent Conc. %	Percent Survival in replicate chambers					Mean percent survival			CV%
	A	B	C	D	E	24 hr	48 hr	7 days	
Control	100	100	100	100	100	100	100	100	0.00
32 %	100	100	100	100	100	100	100	100	0.00
45 %	100	100	100	100	100	100	100	100	0.00
56 %	87.5	100	100	100	100	100	100	97.5	5.73
75 %	100	100	100	100	100	100	100	100	0.00
100 %	75.0	50.0	50.0	25.0	62.5	82.5	72.5	52.5	35.3

DATA TABLE FOR GROWTH

Effluent Conc. %	Average dry weight, mg replicate chambers					Mean dry weight, mg	CV%
	A	B	C	D	E		
Control	0.425	0.422	0.456	0.371	0.448	0.424	7.83
32 %	0.349	0.476	0.468	0.484	0.470	0.449	12.6
45 %	0.436	0.348	0.509	0.490	0.510	0.459	15.0
56 %	0.419	0.456	0.450	0.434	0.488	0.449	5.78
75 %	0.392	0.371	0.371	0.449	0.472	0.411	11.4
100 %	0.224	0.175	0.149	0.066	0.214	0.166	38.2

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	(100 %)	<u> X </u> YES	<u> </u> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<u> </u> YES	<u> </u> 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	(100 %)	<u> X </u> YES	<u> </u> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<u> </u> YES	<u> </u> NO

- | | | |
|--|------------------|---------|
| 3. If you answered NO to 1.a) enter [0] otherwise enter [1]: | <u> 1 </u> | (TLP6C) |
| 4. If you answered NO to 2.a) enter [0] otherwise enter [1]: | <u> 1 </u> | (TGP6C) |
| 5. NOEC Pimephales Lethality: | <u> 75 % </u> | (TOP6C) |
| 6. LOEC Pimephales Lethality: | <u> 100 % </u> | (TXP6C) |
| 7. NOEC Pimephales Sublethality: | <u> 75 % </u> | (TPP6C) |
| 8. LOEC Pimephales Sublethality: | <u> 75 % </u> | (TYP6C) |
| 9. Coefficient of variation for Pimephales growth: | <u> 38.2 </u> | (TQP6C) |

Appendix B: Test 1000.0

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

PERMITTEE: El Dorado Water Utilities
NPDES NO.: AR0033723 AFIN No. 70-00341
CONTACT: Mr. Harold Baker
ANALYST: 275, 280, 298, 304

Test Initiated: DATE: July 10, 2012 TIME: 1215
Test Terminated: DATE: July 17, 2012 TIME: 1025

DILUTION Control	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.9	8.0	8.0	6.8	8.0	7.8	7.9
Final	7.4	7.3	7.3	8.0	7.9	7.2	6.5
pH Initial	7.4	7.4	7.4	8.0	7.9	7.4	7.8
Final	8.2	8.2	8.2	7.8	8.5	7.6	7.4
Alkalinity	30	NA	30	NA	30	NA	NA
Hardness	46	NA	44	NA	44	NA	NA
Conductivity	100	98	96	89	80	88	75
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 32 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	7.8	7.8	6.6	7.9	7.8	7.9
Final	7.4	7.2	7.2	8.0	7.9	7.2	5.9
pH Initial	7.3	7.7	7.9	8.1	7.5	8.1	7.2
Final	8.1	8.1	8.3	7.7	8.4	7.5	7.2
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	240	230	230	230	200	210	180
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 45 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.1	7.8	7.8	6.6	7.8	7.8	7.8
Final	7.5	7.1	6.9	7.8	7.9	7.1	6.0
pH Initial	7.2	7.6	7.8	8.1	7.4	8.1	7.2
Final	8.1	8.1	8.3	7.6	8.4	7.5	7.2
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	300	290	290	280	250	260	230
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 56 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.8	7.6	7.8	6.6	8.1	7.9	7.5
Final	7.2	6.9	7.0	7.8	8.0	7.4	6.2
pH Initial	7.0	7.5	7.8	8.1	7.4	8.1	7.1
Final	8.0	8.0	8.3	7.6	8.4	7.5	7.2
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	350	340	340	330	290	300	270
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 75 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.7	7.7	7.7	6.6	8.2	8.0	7.9
Final	7.0	6.6	7.0	7.6	8.0	7.1	6.6
pH Initial	6.9	7.4	7.7	8.1	7.2	8.0	6.9
Final	7.9	7.9	8.4	7.5	8.4	7.4	7.2
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	440	420	420	410	360	380	340
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 100 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	7.4	7.5	6.5	8.4	7.9	8.0
Final	7.3	6.8	7.0	7.6	8.0	7.1	6.7
pH Initial	6.8	6.8	7.1	8.2	6.7	8.0	6.6
Final	7.9	7.9	8.5	7.4	8.3	7.4	7.2
Alkalinity	36	NA	29	NA	29	NA	NA
Hardness	8.7	NA	7.6	NA	9.1	NA	NA
Conductivity	560	540	540	520	470	490	440
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

Appendix B: Test 1002.0
SUMMARY REPORTING FORMS
CHRONIC BIOMONITORING
Ceriodaphnia dubia
SURVIVAL AND REPRODUCTION

Permittee: El Dorado Water Utilities

NPDES No.: AR0033723 AFIN No. 70-00341

Date and Time Test Initiated: July 10, 2012 at 1415

Date and Time Test Terminated: July 17, 2012 at 1400

Dilution water used: Synthetic Laboratory Soft Water #3889

PERCENT SURVIVAL

Time of Reading	Control	Percent Effluent				
		32 %	45 %	56 %	75 %	100 %
24 hour	100	100	100	100	100	100
48 hour	100	100	100	100	100	100
7 day	100	100	100	100	100	100

NUMBER OF YOUNG PRODUCED PER FEMALE @ 7 DAYS

Replicates	Control	Percent Effluent				
		32 %	45 %	56 %	75 %	100 %
A	18	27	25	22	26	15
B	20	23	28	20	19	21
C	21	17	22	22	21	13
D	21	27	22	21	20	17
E	20	28	23	26	17	11
F	17	18	19	13	19	14
G	23	22	22	26	21	19
H	13	22	24	26	24	20
I	18	25	19	28	29	20
J	19	20	20	29	18	14
Mean per Adult	19.0	22.9	22.4	23.3	21.4	16.4
Mean per Surviving Adult	19.0	22.9	22.4	23.3	21.4	16.4
CV %	14.5	16.8	12.5	20.3	17.8	21.2

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	(100 %)	<u> </u> YES	<u> X </u> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<u> </u> YES	<u> </u> NO

2. Dunnett's 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	(100 %)	<u> </u> YES	<u> X </u> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<u> </u> YES	<u> </u> 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: 100 % (TOP3B)
6. LOEC *Ceriodaphnia* Lethality: 100 % (TXP3B)
7. NOEC *Ceriodaphnia* Sublethality: 100 % (TPP3B)
8. LOEC *Ceriodaphnia* Sublethality: 100 % (TYP3B)
9. Coefficient of variation for *Ceriodaphnia* Reproduction: 21.2 (TQP3B)

Appendix B: Test 1002.0
CHRONIC TOXICITY SUMMARY FORM
Ceriodaphnia dubia
CHEMICAL PARAMETERS CHART

PERMITTEE: El Dorado Water Utilities
NPDES NO.: AR0033723 AFIN No. 70-00341
CONTACT: Mr. Harold Baker
ANALYST: 275, 280, 298, 304

Test Initiated: DATE: July 10, 2012 TIME: 1415
Test Terminated: DATE: July 17, 2012 TIME: 1400

DILUTION	DAY						
	1	2	3	4	5	6	7
Control							
D.O. Initial	7.9	8.0	8.0	6.8	8.0	7.8	7.9
Final	8.3	8.2	8.3	8.6	8.2	8.3	8.0
pH Initial	7.4	7.4	7.4	8.0	7.9	7.4	7.8
Final	8.8	8.8	8.8	8.5	8.9	8.1	8.0
Alkalinity	30	NA	30	NA	30	NA	NA
Hardness	46	NA	44	NA	44	NA	NA
Conductivity	100	98	96	89	80	88	75
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
32 %							
D.O. Initial	8.0	7.8	7.8	6.6	7.9	7.8	7.9
Final	8.4	8.3	8.4	8.4	8.2	8.4	8.0
pH Initial	7.3	7.7	7.9	8.1	7.5	8.1	7.2
Final	8.7	8.8	8.8	8.4	8.8	8.0	7.9
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	240	230	230	230	200	210	180
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
45 %							
D.O. Initial	8.1	7.8	7.8	6.6	7.8	7.8	7.8
Final	8.4	8.2	8.3	8.6	8.2	8.4	8.0
pH Initial	7.2	7.6	7.8	8.1	7.4	8.1	7.2
Final	8.6	8.8	8.8	8.4	8.8	8.0	7.8
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	300	290	290	280	250	260	230
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
56 %							
D.O. Initial	7.8	7.6	7.8	6.6	8.1	7.9	7.5
Final	8.4	8.3	8.4	8.5	8.2	8.4	7.9
pH Initial	7.0	7.5	7.8	8.1	7.4	8.1	7.1
Final	8.7	8.8	8.7	8.3	8.8	8.0	7.8
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	350	340	340	330	290	300	270
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
75 %							
D.O. Initial	7.7	7.7	7.7	6.6	8.2	8.0	7.9
Final	8.4	8.4	8.4	8.5	8.3	8.1	7.9
pH Initial	6.9	7.4	7.7	8.1	7.2	8.0	6.9
Final	8.6	8.7	8.6	8.3	8.7	7.9	7.8
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	440	420	420	410	360	380	340
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
100 %							
D.O. Initial	8.0	7.4	7.5	6.5	8.4	7.9	8.0
Final	8.4	8.2	8.3	8.5	8.4	8.3	7.8
pH Initial	6.8	6.8	7.1	8.2	6.7	8.0	6.6
Final	8.5	8.6	8.6	8.0	8.7	7.9	7.7
Alkalinity	36	NA	29	NA	29	NA	NA
Hardness	8.7	NA	7.6	NA	9.1	NA	NA
Conductivity	560	540	540	520	470	490	440
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA



8600 Kanis Road
 Little Rock, AR 72204-2322
 (501) 224-5060
 FAX (501) 224-5072

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

PAGE 1 OF 1

Client: EL DORADO WATER UTILITIES			PO No.		NO OF BOTTLES	ANALYSES REQUESTED												AIC CONTROL NO: 159195			
Project Reference: SOUTH EFFLUENT			SAMPLE MATRIX			BIO MONITORING													AIC PROPOSAL NO:		
Project Manager: HAROLD BAKER			W	S															Carrier: Fed-X		
Sampled By: JOHN M. PEPPERS			G	C	A	S													Received Temperature C 2		
AIC No.	Sample Identification	Date/Time Collected	B	P	R	L													Remarks		
2	SE-1591	0930 7-11-12					3														
																		Field pH calibration on _____ @ _____			
			Container Type															Buffer:			
			Preservative																		
			G = Glass NO = none			P = Plastic S = Sulfuric acid pH2			V = VOA vials N = Nitric acid pH2			H = HCl to pH2 B = NaOH to pH12			T = Sodium Thiosulfate Z = Zinc acetate						
Turnaround Time Requested: (Please circle) NORMAL or EXPEDITED IN _____ DAYS						Relinquished By: JOHN M. PEPPERS <i>J.M. Pepp</i>		Date/Time 1630 7-11-12		Received By:		Date/Time									
Expedited results requested by: _____						Relinquished By:		Date/Time		Received in Lab By: Greg Hopton		Date/Time 7-12-12 0800									
Who should AIC contact with questions: JOHN M. PEPPERS						Comments:															
Phone: 870-814-1764 LAB # 870-862-0421																					
Report Attention to: HAROLD BAKER																					
Report Address to: P.O. Box 1587 EL DORADO, AR 71731																					

8764 3753 6157

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

PAGE 1 OF 1

Client: <u>EL DORADO WATER UTILITIES</u>			PO No.		NO OF BOTTLES	ANALYSES REQUESTED										AIC CONTROL NO: <u>159195</u>				
Project Reference: <u>SOUTH EFFLUENT</u>			SAMPLE MATRIX			BIOMONITORING											AIC PROPOSAL NO:			
Project Manager: <u>HAROLD BAKER</u>			W	A			S											Carrier: <u>Fed Ex</u>		
Sampled By: <u>JOHN M. PEPPERS</u>			G	C	A	S											Received Temperature C <u>2°</u>			
AIC No.	Sample Identification	Date/Time Collected	A	M	T	O											Remarks			
<u>3</u>	<u>SE-1592</u>	<u>0930 7-13-12</u>	<u>OH</u>	<u>✓</u>			<u>3</u>													
Container Type						<u>P</u>													Field pH calibration on _____ @ _____	
Preservative						<u>NO</u>													Buffer:	
G = Glass NO = none			P = Plastic S = Sulfuric acid pH2			V = VOA vials N = Nitric acid pH2			H = HCl to pH2 B = NaOH to pH12			T = Sodium Thiosulfate Z = Zinc acetate								
Turnaround Time Requested: (Please circle) <u>(NORMAL)</u> or EXPEDITED IN ___ DAYS						Relinquished By: <u>John M. Peppers</u>		Date/Time: <u>1630 7-13-12</u>		Received By: <u>[Signature]</u>		Date/Time: <u>7-14-12 0715</u>								
Expedited results requested by: _____						Relinquished By: _____		Date/Time: _____		Received in Lab By: <u>[Signature]</u>		Date/Time: _____								
Who should AIC contact with questions: <u>JOHN M. PEPPERS</u>						Comments:														
Phone: <u>870-814-1764</u> LAB # <u>870-862-0421</u>																				
Report Attention to: <u>HAROLD BAKER</u>																				
Report Address to: <u>P.O. Box 1587 EL DORADO, AR 71731</u>																				

8764 37536179



August 10, 2012

Test Results of
Third Quarter
Chronic 7-Day Renewal
Biomonitoring Testing
for
Outfall 001
South Effluent

Control No. 160471-1

Prepared for:

Mr. Harold Baker
El Dorado Water Utilities
Post Office Box 1587
El Dorado, AR 71731

Prepared by:

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

El Dorado Water Utilities
ATTN: Mr. Harold Baker
Post Office Box 1587
El Dorado, AR 71731

Re: Chronic 7-Day Renewal utilizing *Pimephales promelas* (Fathead minnow)
Outfall 001 - South Effluent
NPDES Permit No. AR0033723 AFIN No. 70-00341

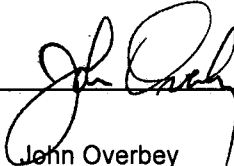
Dear Mr. Harold Baker:

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 75 % effluent, which is below the critical dilution of 100 %. The NOEC for growth occurred at 75 % effluent, which is below the critical dilution of 100 %. **The sample, therefore, FAILED both lethal and sub-lethal effects for the Fathead minnow test.**

AMERICAN INTERPLEX CORPORATION



John Overbey
Laboratory Director

PDF cc: El Dorado Water Utilities
ATTN: Mr. Harold Baker
harold@eldoradowater.com

El Dorado Water Utilities
ATTN: Mr. John Peppers
lab@eldoradowater.com

GBMc & Associates, Inc.
ATTN: Mr. Roland McDaniel
rmcdaniel@gbmcassoc.com

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Appendix B: Chains of Custody

I. Control Acceptance Criteria

Pimephales promelas (Fathead minnow) Method 1000.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	97.5	PASS
Control Growth > or = 0.25 mg per Surviving minnow	0.466	PASS
Control Growth CV < or = 40%	12.2	PASS
Growth Minimum Significant Difference 12 to 30%	11.1	BELOW
Critical Dilution CV < or = 40%	41.5	FAIL

II. Outlined Report

A. Introduction

1. Permit Number: AR0033723 AFIN No. 70-00341
2. Test Requirements: Chronic Biomonitoring, Quarterly Test Method 1000.0
3. Receiving Stream: Bayou de Loutre

B. Source of Effluent/Dilution Water

1. Effluent Samples:

- a. Sampling Point: Outfall 001
- b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	8.1	8.2	7.5
pH (standard units)	6.9	6.7	7.2
Alkalinity (mg/l as CaCO ₃)	42	39	36
Hardness (mg/l as CaCO ₃)	8.3	7.7	8.9
Conductivity (umhos/cm)	940	870	830
Residual Chlorine (mg/l)	0.11	<0.05	<0.05
Ammonia as N (mg/l)	0.71	<0.1	0.65

2. Dilution Water Samples: Synthetic Soft Water #3902

- a. Dates Prepared: August 21 through September 4, 2012
- b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	8.2	7.1	7.3
pH (standard units)	7.9	7.7	7.8
Alkalinity (mg/l as CaCO ₃)	30	30	30
Hardness (mg/l as CaCO ₃)	44	42	45
Conductivity (umhos/cm)	160	150	150
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 Method 1000.0, Fathead Minnow Survival and Growth.

2. Endpoint: No Observable Effects Concentration (NOEC)

3. Test Conditions:

Pimephales promelas (Fathead minnow) Survival and Growth Method 1000.0

Date & Time Test Initiated: August 28, 2012 at 1110
Date & Time Test Terminated: September 4, 2012 at 1107
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

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*

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.

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 August 9, 2012 at 1440 to August 16, 2012 at 1450

The results were as follows: (Control No. 160011-2.)

Survival LC-50: 5808 mg/l

Growth IC-25: 5283 mg/l

Growth PMSD: 15.3

V. Chemical Analysis/Quality Control

Parameter	Method	% Recovery	Relative % Difference
Alkalinity	SM 2320 B	NA	0.00
Hardness	EPA 200.7	98.9	0.460
pH	SM 4500-H+ B	101	0.401
Conductivity	EPA 120.1	101	1.99

VI. Organism History

Pimephales promelas (Fathead minnow)

Date: August 28, 2012

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

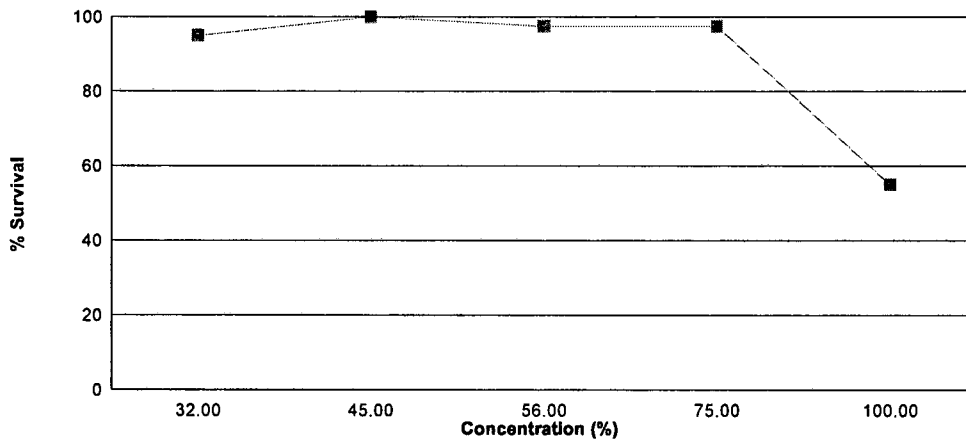
Larvae are exposed in a static renewal system for seven days to different concentrations of effluent with dilution water. Test results are based on the survival and growth (increase in weight) of the larvae.

Effluent dilutions for this test were 32 %, 45 %, 56 %, 75 %, 100 % in accordance with the NPDES permit.

The low flow or 'critical' dilution is specified in the NPDES permit as 100 % effluent.

The test was initiated on August 28, 2012 at 1110 and continued through September 4, 2012 at 1107. Statistical analyses were performed on the observed data and the no observable effects concentrations (NOECs) were as follows:

- a.) NOEC survival = 75 % effluent
- b.) NOEC growth = 75 % effluent



Summary of the 7-day Fathead Minnow Survival and Growth		
Concentration	Percent Survival	Mean Growth (mg)
Control	97.5	0.454
32 %	95.0	0.495
45 %	100	0.489
56 %	97.5	0.485
75 %	97.5	0.488
100 %	55.0 *	--

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

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Survival

Date and Time Test Initiated: August 28, 2012 at 1110
Date and Time Test Terminated: September 4, 2012 at 1107

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	7
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
32 %	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	8	8
	C	8	7	7	7	7	7	7
	D	8	8	8	8	8	8	8
	E	8	8	7	7	7	7	7
45 %	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
56 %	A	8	7	7	7	7	7	7
	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
75 %	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	7	7	7	7	7	7	7
	E	8	8	8	8	8	8	8
100 %	A	8	6	5	5	5	5	5
	B	7	5	5	5	4	4	4
	C	7	4	4	4	3	3	3
	D	8	4	4	4	3	3	3
	E	8	7	7	7	7	7	7

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Growth

Test Initiated: August 28, 2012 at 1110
Test Terminated: September 4, 2012 at 1107

Drying Started: September 3, 2012 at 1634
Drying Ended: September 5, 2012 at 1035

Concentration	Replicate	Weight of pan	Weight of pan + fish	Total weight of fish (g)	Original # of fish	Mean dry weight (mg)
Control	A	.91843	.92193	0.00350	8	0.438
	B	.91985	.92312	0.00327	8	0.409
	C	.93662	.94008	0.00346	8	0.432
	D	.92677	.93031	0.00354	8	0.442
	E	.93073	.93514	0.00441	8	0.551
32 %	A	.91646	.92038	0.00392	8	0.490
	B	.92419	.92814	0.00395	8	0.494
	C	.92526	.92902	0.00376	8	0.470
	D	.92464	.92869	0.00405	8	0.506
	E	.91555	.91968	0.00413	8	0.516
45 %	A	.91613	.91987	0.00374	8	0.468
	B	.91712	.92086	0.00374	8	0.468
	C	.91960	.92362	0.00402	8	0.502
	D	.92186	.92598	0.00412	8	0.515
	E	.92340	.92735	0.00395	8	0.494
56 %	A	.92817	.93184	0.00367	8	0.459
	B	.92518	.92872	0.00354	8	0.442
	C	.92590	.92987	0.00397	8	0.496
	D	.92606	.93007	0.00401	8	0.501
	E	.92683	.93106	0.00423	8	0.529
75 %	A	.92680	.93096	0.00416	8	0.520
	B	.92692	.93043	0.00351	8	0.439
	C	.92736	.93140	0.00404	8	0.505
	D	.92858	.93249	0.00391	8	0.489
	E	.92882	.93273	0.00391	8	0.489
100 %	A	.92910	.93127	0.00217	8	0.271
	B	.92802	.92978	0.00176	8	0.220
	C	.92940	.93071	0.00131	8	0.164
	D	.93053	.93215	0.00162	8	0.202
	E	.92939	.93290	0.00351	8	0.439

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	0.87500	1.20940
1	Control	4	1.00000	1.39310
1	Control	5	1.00000	1.39310
2	32 %	1	1.00000	1.39310
2	32 %	2	1.00000	1.39310
2	32 %	3	0.87500	1.20940
2	32 %	4	1.00000	1.39310
2	32 %	5	0.87500	1.20940
3	45 %	1	1.00000	1.39310
3	45 %	2	1.00000	1.39310
3	45 %	3	1.00000	1.39310
3	45 %	4	1.00000	1.39310
3	45 %	5	1.00000	1.39310
4	56 %	1	0.87500	1.20940
4	56 %	2	1.00000	1.39310
4	56 %	3	1.00000	1.39310
4	56 %	4	1.00000	1.39310
4	56 %	5	1.00000	1.39310
5	75 %	1	1.00000	1.39310
5	75 %	2	1.00000	1.39310
5	75 %	3	1.00000	1.39310
5	75 %	4	0.87500	1.20940
5	75 %	5	1.00000	1.39310
6	100 %	1	0.62500	0.91174
6	100 %	2	0.50000	0.78540
6	100 %	3	0.37500	0.65906
6	100 %	4	0.37500	0.65906
6	100 %	5	0.87500	1.20940

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Survival

Shapiro - Wilk's Test for Normality		Transform: Arc Sin(Square Root(Y))
<p>D = 0.3314 W = 0.8222 Critical W = 0.9 (alpha = 0.01, N = 30) Critical W = 0.927 (alpha = 0.05, N = 30)</p> <p>Data FAIL normality test (alpha = 0.01).</p>		

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	32 %	25.00	16.00	5.00	
3	45 %	30.00	16.00	5.00	
4	56 %	27.50	16.00	5.00	
5	75 %	27.50	16.00	5.00	
6	100 %	15.50	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
<p>D = 0.02383 W = 0.9351 Critical W = 0.888 (alpha = 0.01, N = 25) Critical W = 0.918 (alpha = 0.05, N = 25)</p> <p>Data PASS normality test (alpha = 0.01).</p>	

Bartlett's Test for Homogeneity of Variance	No Transformation
<p>Calculated B1 statistic = 6.019 Critical B = 13.277 (alpha = 0.01, df = 4)</p> <p>Data PASS B1 homogeneity test at 0.01 level.</p>	

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Growth

ANOVA Table				No Transformation	
SOURCE	DF	SS	MS	F	
Between	4	0.005209	0.001302	1.092	
Within (Error)	20	0.02383	0.001192		
Total	24	0.02904			
Critical F = 4.43 (alpha = 0.01, df = 4,20)					
2.87 (alpha = 0.05, df = 4,20)					
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	0.4544	0.4544		
2	32 %	0.4952	0.4952	-1.868	
3	45 %	0.4894	0.4894	-1.603	
4	56 %	0.4854	0.4854	-1.42	
5	75 %	0.4884	0.4884	-1.557	
Dunnett's critical value = 2.3 (1 Tailed, alpha = 0.05, df = 4,20) (Actual df = 4,20)					

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	32 %	5	0.05022	11.1	-0.0408	
3	45 %	5	0.05022	11.1	-0.035	
4	56 %	5	0.05022	11.1	-0.031	
5	75 %	5	0.05022	11.1	-0.034	

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: August 28, 2012 at 0823
Date and Time Test Terminated: September 4, 2012 at 1107

Effluent Conc.: Control		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.2	7.4	7.1	7.3	7.3	7.2	7.2
	Final	7.1	5.4	6.5	7.0	6.4	6.0	6.4
pH, units	Initial	7.9	7.8	7.7	7.8	7.8	7.9	7.8
	Final	7.6	7.2	7.5	7.7	7.6	7.5	7.4
Alkalinity, mg CaCO ₃ /l		30	NA	30	NA	30	NA	NA
Hardness, mg CaCO ₃ /l		44	NA	42	NA	45	NA	NA
Conductivity, umhos/cm		160	160	150	150	150	150	150
Res. Chlorine, mg/l		<0.05	NA	<0.05	NA	<0.05	NA	NA

Effluent Conc.: 32 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.1	7.3	7.2	7.0	7.2	7.2	6.8
	Final	7.0	5.4	5.8	7.0	6.0	6.0	6.0
pH, units	Initial	7.2	7.4	7.4	7.7	7.7	8.1	7.4
	Final	7.4	7.2	7.4	7.7	7.6	7.5	7.4

Effluent Conc.: 45 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.2	7.4	7.3	7.2	7.4	7.5	7.3
	Final	6.9	5.8	5.4	7.2	6.1	6.1	6.3
pH, units	Initial	7.0	7.3	7.1	7.6	7.7	8.1	7.2
	Final	7.4	7.3	7.3	7.8	7.6	7.5	7.4

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: August 28, 2012 at 0823
Date and Time Test Terminated: September 4, 2012 at 1107

Effluent Conc.: 56 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.3	7.3	7.0	7.3	7.4	7.3	7.2
	Final	6.9	5.8	5.6	6.6	5.8	6.0	5.9
pH, units	Initial	6.9	7.2	7.0	7.6	7.7	8.0	7.1
	Final	7.4	7.3	7.4	7.6	7.5	7.5	7.4

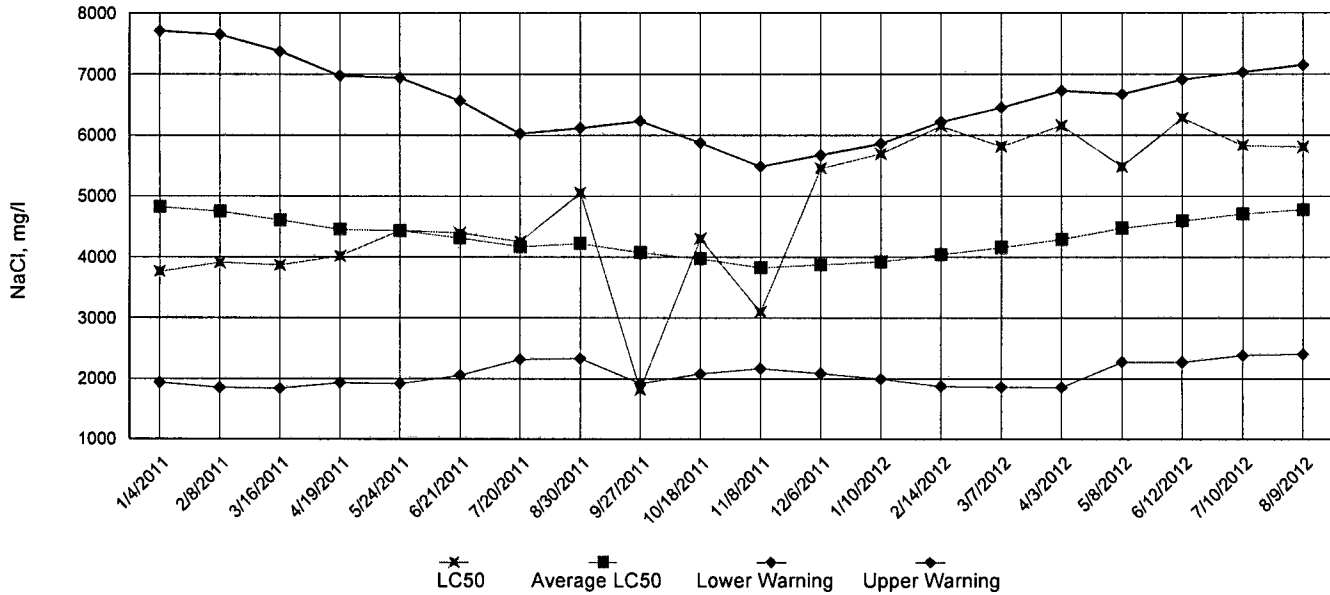
Effluent Conc.: 75 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.3	7.3	7.0	7.3	7.1	7.0	7.0
	Final	7.2	6.0	6.2	7.1	6.0	7.1	6.7
pH, units	Initial	6.9	7.1	7.1	7.4	7.4	8.0	7.0
	Final	7.5	7.3	7.4	7.7	7.5	7.8	7.5

Effluent Conc.: 100 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.1	7.2	8.2	7.8	7.5	7.2	6.9
	Final	6.9	5.8	6.3	7.1	6.2	6.6	6.4
pH, units	Initial	6.9	6.6	6.7	7.1	7.2	7.8	6.6
	Final	7.3	7.2	7.4	7.6	7.5	7.6	7.5
Alkalinity, mg CaCO ₃ /l		42	NA	39	NA	36	NA	NA
Hardness, mg CaCO ₃ /l		8.3	NA	7.7	NA	8.9	NA	NA
Conductivity, umhos/cm		940	880	870	880	830	820	860
Res. Chlorine, mg/l		0.11	NA	<0.05	NA	<0.05	NA	NA

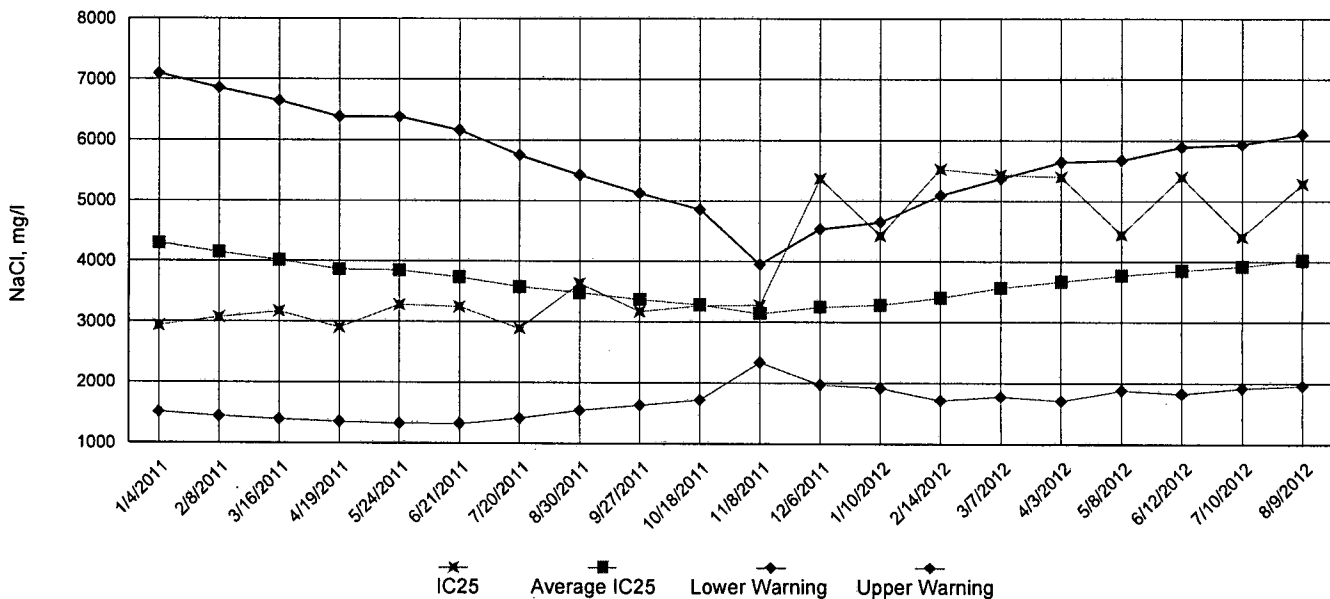
Appendix A4: Test 1000.0

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

LC50 Survival Data



IC25 Growth Data



Appendix B: Test 1000.0
SUMMARY REPORTING FORMS
CHRONIC BIOMONITORING
Pimephales promelas (Fathead Minnow)
SURVIVAL AND GROWTH

Permittee: El Dorado Water Utilities

NPDES No.: AR0033723 AFIN No. 70-00341

Date and Time Test Initiated: August 28, 2012 at 1110

Date and Time Test Terminated: September 4, 2012 at 1107

Dilution water used: Synthetic Soft Water #3902

DATA TABLE FOR SURVIVAL

Effluent Conc. %	Percent Survival in replicate chambers					Mean percent survival			CV%
	A	B	C	D	E	24 hr	48 hr	7 days	
Control	100	100	87.5	100	100	100	100	97.5	5.73
32 %	100	100	87.5	100	87.5	100	97.5	95.0	7.21
45 %	100	100	100	100	100	100	100	100	0.00
56 %	87.5	100	100	100	100	100	97.5	97.5	5.73
75 %	100	100	100	87.5	100	97.5	97.5	97.5	5.73
100 %	62.5	50.0	37.5	37.5	87.5	95.0	65.0	55.0	38.0

DATA TABLE FOR GROWTH

Effluent Conc. %	Average dry weight, mg replicate chambers					Mean dry weight, mg	CV%
	A	B	C	D	E		
Control	0.438	0.409	0.432	0.442	0.551	0.454	12.2
32 %	0.490	0.494	0.470	0.506	0.516	0.495	3.52
45 %	0.468	0.468	0.502	0.515	0.494	0.489	4.28
56 %	0.459	0.442	0.496	0.501	0.529	0.485	7.16
75 %	0.520	0.439	0.505	0.489	0.489	0.488	6.24
100 %	0.271	0.220	0.164	0.202	0.439	0.259	41.5

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	(100 %)	<u> X </u> YES	<u> </u> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<u> </u> YES	<u> </u> 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	(100 %)	<u> X </u> YES	<u> </u> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<u> </u> YES	<u> </u> NO

- | | | |
|--|------------------|---------|
| 3. If you answered NO to 1.a) enter [0] otherwise enter [1]: | <u> 1 </u> | (TLP6C) |
| 4. If you answered NO to 2.a) enter [0] otherwise enter [1]: | <u> 1 </u> | (TGP6C) |
| 5. NOEC Pimephales Lethality: | <u> 75 % </u> | (TOP6C) |
| 6. LOEC Pimephales Lethality: | <u> 100 % </u> | (TXP6C) |
| 7. NOEC Pimephales Sublethality: | <u> 75 % </u> | (TPP6C) |
| 8. LOEC Pimephales Sublethality: | <u> 75 % </u> | (TYP6C) |
| 9. Coefficient of variation for Pimephales growth: | <u> 41.5 </u> | (TQP6C) |

Appendix B: Test 1000.0

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

PERMITTEE: El Dorado Water Utilities
NPDES NO.: AR0033723 AFIN No. 70-00341
CONTACT: Mr. Harold Baker
ANALYST: 275, 280, 298, 304

Test Initiated: DATE: August 28, 2012 TIME: 1110
Test Terminated: DATE: September 4, 2012 TIME: 1107

DILUTION Control	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.2	7.4	7.1	7.3	7.3	7.2	7.2
Final	7.1	5.4	6.5	7.0	6.4	6.0	6.4
pH Initial	7.9	7.8	7.7	7.8	7.8	7.9	7.8
Final	7.6	7.2	7.5	7.7	7.6	7.5	7.4
Alkalinity	30	NA	30	NA	30	NA	NA
Hardness	44	NA	42	NA	45	NA	NA
Conductivity	160	160	150	150	150	150	150
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 32 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.1	7.3	7.2	7.0	7.2	7.2	6.8
Final	7.0	5.4	5.8	7.0	6.0	6.0	6.0
pH Initial	7.2	7.4	7.4	7.7	7.7	8.1	7.4
Final	7.4	7.2	7.4	7.7	7.6	7.5	7.4
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	NA	390	390	490	460	460	380
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 45 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.2	7.4	7.3	7.2	7.4	7.5	7.3
Final	6.9	5.8	5.4	7.2	6.1	6.1	6.3
pH Initial	7.0	7.3	7.1	7.6	7.7	8.1	7.2
Final	7.4	7.3	7.3	7.8	7.6	7.5	7.4
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	NA	480	480	560	530	520	470
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 56 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.3	7.3	7.0	7.3	7.4	7.3	7.2
Final	6.9	5.8	5.6	6.6	5.8	6.0	5.9
pH Initial	6.9	7.2	7.0	7.6	7.7	8.0	7.1
Final	7.4	7.3	7.4	7.6	7.5	7.5	7.4
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	NA	550	560	620	590	580	550
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 75 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.3	7.3	7.0	7.3	7.1	7.0	7.0
Final	7.2	6.0	6.2	7.1	6.0	7.1	6.7
pH Initial	6.9	7.1	7.1	7.4	7.4	8.0	7.0
Final	7.5	7.3	7.4	7.7	7.5	7.8	7.5
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	NA	690	690	730	690	690	680
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 100 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.1	7.2	8.2	7.8	7.5	7.2	6.9
Final	6.9	5.8	6.3	7.1	6.2	6.6	6.4
pH Initial	6.9	6.6	6.7	7.1	7.2	7.8	6.6
Final	7.3	7.2	7.4	7.6	7.5	7.6	7.5
Alkalinity	42	NA	39	NA	36	NA	NA
Hardness	8.3	NA	7.7	NA	8.9	NA	NA
Conductivity	940	880	870	880	830	820	860
Chlorine	0.11	NA	<0.05	NA	<0.05	NA	NA

September 26, 2012

Test Results of
Third Quarter
Chronic 7-Day Renewal
Biomonitoring Testing
for
Outfall 001
South Effluent

Control No. 161015-1

Prepared for:

Mr. Harold Baker
El Dorado Water Utilities
Post Office Box 1587
El Dorado, AR 71731

Prepared by:

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

El Dorado Water Utilities
ATTN: Mr. Harold Baker
Post Office Box 1587
El Dorado, AR 71731

Re: Chronic 7-Day Renewal utilizing *Pimephales promelas* (Fathead minnow)
Outfall 001 - South Effluent
NPDES Permit No. AR0033723 AFIN No. 70-00341

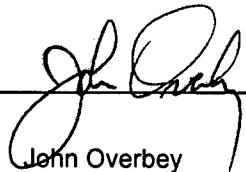
Dear Mr. Harold Baker:

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 100 % effluent, which is equal to the critical dilution of 100 %. The NOEC for growth occurred at 100 % effluent, which is equal to the critical dilution of 100 %. **The sample, therefore, PASSED both lethal and sub-lethal effects for the Fathead minnow test.**

AMERICAN INTERPLEX CORPORATION



John Overbey
Laboratory Director

PDF cc: El Dorado Water Utilities
ATTN: Mr. Harold Baker
harold@eldoradowater.com

El Dorado Water Utilities
ATTN: Mr. John Peppers
lab@eldoradowater.com

GBMc & Associates, Inc.
ATTN: Mr. Roland McDaniel
rmcdaniel@gbmcassoc.com

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III. Data Analysis

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Pimephales promelas (Fathead minnow)

Appendix A: Raw Data

A1: Test 1000.0

Pimephales promelas (Fathead minnow) Survival and Growth

A2: Statistics

A3: Water Chemistry

A4: Reference Toxicant

Appendix B: Chains of Custody

I. Control Acceptance Criteria

Pimephales promelas (Fathead minnow) Method 1000.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	97.5	PASS
Control Growth > or = 0.25 mg per Surviving minnow	0.491	PASS
Control Growth CV < or = 40%	9.29	PASS
Growth Minimum Significant Difference 12 to 30%	15.2	PASS
Critical Dilution CV < or = 40%	14.4	PASS

II. Outlined Report

A. Introduction

1. Permit Number: AR0033723 AFIN No. 70-00341
2. Test Requirements: Chronic Biomonitoring, Quarterly Test Method 1000.0
3. Receiving Stream: Bayou de Loutre

B. Source of Effluent/Dilution Water

1. Effluent Samples:

- a. Sampling Point: Outfall 001
- b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	6.4	6.5	6.5
pH (standard units)	6.9	7.1	7.9
Alkalinity (mg/l as CaCO ₃)	37	34	29
Hardness (mg/l as CaCO ₃)	17	17	15
Conductivity (umhos/cm)	700	840	710
Residual Chlorine (mg/l)	<0.05	<0.05	<0.05
Ammonia as N (mg/l)	0.20	0.68	<0.1

2. Dilution Water Samples: Synthetic Soft Water #3908

- a. Dates Prepared: September 5 through September 19, 2012
- b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	6.8	6.2	6.7
pH (standard units)	7.8	7.8	7.9
Alkalinity (mg/l as CaCO ₃)	30	30	30
Hardness (mg/l as CaCO ₃)	48	47	41
Conductivity (umhos/cm)	130	160	140
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 Method 1000.0, Fathead Minnow Survival and Growth.

2. Endpoint: No Observable Effects Concentration (NOEC)

3. Test Conditions:

Pimephales promelas (Fathead minnow) Survival and Growth Method 1000.0

Date & Time Test Initiated: September 18, 2012 at 1620

Date & Time Test Terminated: September 25, 2012 at 1430

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

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*

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.

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 September 5, 2012 at 1250 to September 12, 2012 at 1115

The results were as follows: (Control No. 160675-1.)

Survival LC-50: 7105 mg/l
Growth IC-25: 6473 mg/l
Growth PMSD: 32.2

V. Chemical Analysis/Quality Control

Parameter	Method	% Recovery	Relative % Difference
Alkalinity	SM 2320 B	NA	0.00
Hardness	EPA 200.7	101	4.60
pH	SM 4500-H+ B	100	0.269
Conductivity	EPA 120.1	100	0.678

VI. Organism History

Pimephales promelas (Fathead minnow)

Date: September 18, 2012

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

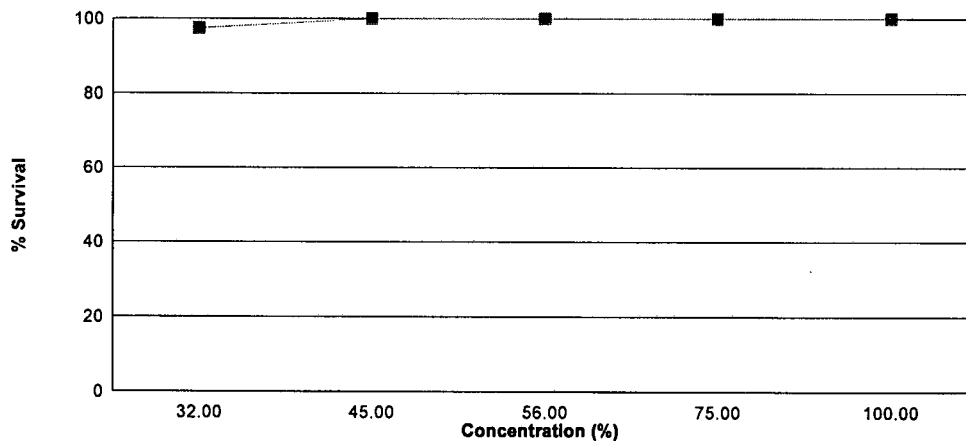
Larvae are exposed in a static renewal system for seven days to different concentrations of effluent with dilution water. Test results are based on the survival and growth (increase in weight) of the larvae.

Effluent dilutions for this test were 32 %, 45 %, 56 %, 75 %, 100 % in accordance with the NPDES permit.

The low flow or 'critical' dilution is specified in the NPDES permit as 100 % effluent.

The test was initiated on September 18, 2012 at 1620 and continued through September 25, 2012 at 1430. Statistical analyses were performed on the observed data and the no observable effects concentrations (NOECs) were as follows:

- a.) NOEC survival = 100 % effluent
- b.) NOEC growth = 100 % effluent



Summary of the 7-day Fathead Minnow Survival and Growth		
Concentration	Percent Survival	Mean Growth (mg)
Control	97.5	0.479
32 %	97.5	0.525
45 %	100	0.560
56 %	100	0.562
75 %	100	0.568
100 %	100	0.532

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Survival

Date and Time Test Initiated: September 18, 2012 at 1620

Date and Time Test Terminated: September 25, 2012 at 1430

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	7	7	7
	E	8	8	8	8	8	8	8
32 %	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	7	7	7	7	7	7
45 %	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
56 %	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
75 %	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
100 %	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

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Growth

Test Initiated: September 18, 2012 at 1620
Test Terminated: September 25, 2012 at 1430

Drying Started: September 21, 2012 at 1101
Drying Ended: September 26, 2012 at 1140

Concentration	Replicate	Weight of pan	Weight of pan + fish	Total weight of fish (g)	Original # of fish	Mean dry weight (mg)
Control	A	.93522	.93888	0.00366	8	0.458
	B	.93560	.93908	0.00348	8	0.435
	C	.92596	.93035	0.00439	8	0.549
	D	.92913	.93280	0.00367	8	0.459
	E	.92745	.93141	0.00396	8	0.495
32 %	A	.92697	.93154	0.00457	8	0.571
	B	.92586	.92991	0.00405	8	0.506
	C	.92623	.93058	0.00435	8	0.544
	D	.93262	.93665	0.00403	8	0.504
	E	.92785	.93185	0.00400	8	0.500
45 %	A	.93025	.93456	0.00431	8	0.539
	B	.93658	.94094	0.00436	8	0.545
	C	.93491	.93895	0.00404	8	0.505
	D	.93650	.94147	0.00497	8	0.621
	E	.93665	.94137	0.00472	8	0.590
56 %	A	.93567	.94046	0.00479	8	0.599
	B	.93182	.93628	0.00446	8	0.558
	C	.93106	.93575	0.00469	8	0.586
	D	.93460	.93840	0.00380	8	0.475
	E	.93443	.93917	0.00474	8	0.592
75 %	A	.93465	.93896	0.00431	8	0.539
	B	.94237	.94706	0.00469	8	0.586
	C	.94021	.94453	0.00432	8	0.540
	D	.94008	.94479	0.00471	8	0.589
	E	.93995	.94465	0.00470	8	0.588
100 %	A	.94055	.94496	0.00441	8	0.551
	B	.93427	.93771	0.00344	8	0.430
	C	.93214	.93724	0.00510	8	0.638
	D	.93094	.93529	0.00435	8	0.544
	E	.92940	.93336	0.00396	8	0.495

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	0.87500	1.20940
1	Control	5	1.00000	1.39310
2	32 %	1	1.00000	1.39310
2	32 %	2	1.00000	1.39310
2	32 %	3	1.00000	1.39310
2	32 %	4	1.00000	1.39310
2	32 %	5	0.87500	1.20940
3	45 %	1	1.00000	1.39310
3	45 %	2	1.00000	1.39310
3	45 %	3	1.00000	1.39310
3	45 %	4	1.00000	1.39310
3	45 %	5	1.00000	1.39310
4	56 %	1	1.00000	1.39310
4	56 %	2	1.00000	1.39310
4	56 %	3	1.00000	1.39310
4	56 %	4	1.00000	1.39310
4	56 %	5	1.00000	1.39310
5	75 %	1	1.00000	1.39310
5	75 %	2	1.00000	1.39310
5	75 %	3	1.00000	1.39310
5	75 %	4	1.00000	1.39310
5	75 %	5	1.00000	1.39310
6	100 %	1	1.00000	1.39310
6	100 %	2	1.00000	1.39310
6	100 %	3	1.00000	1.39310
6	100 %	4	1.00000	1.39310
6	100 %	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))
<p>D = 0.05399 W = 0.5466 Critical W = 0.9 (alpha = 0.01, N = 30) Critical W = 0.927 (alpha = 0.05, N = 30)</p>		
<p>Data FAIL normality test (alpha = 0.01).</p>		

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	32 %	27.50	16.00	5.00	
3	45 %	30.00	16.00	5.00	
4	56 %	30.00	16.00	5.00	
5	75 %	30.00	16.00	5.00	
6	100 %	30.00	16.00	5.00	
<p>Critical values are 1 tailed (k=5)</p>					

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Growth

Shapiro - Wilk's Test for Normality	No Transformation
<p>D = 0.05688 W = 0.9752 Critical W = 0.9 (alpha = 0.01, N = 30) Critical W = 0.927 (alpha = 0.05, N = 30)</p> <p>Data PASS normality test (alpha = 0.01).</p>	

Bartlett's Test for Homogeneity of Variance	No Transformation
<p>Calculated B1 statistic = 5.164 Critical B = 15.086 (alpha = 0.01, df = 5)</p> <p>Data PASS B1 homogeneity test at 0.01 level.</p>	

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Growth

ANOVA Table				No Transformation	
SOURCE	DF	SS	MS	F	
Between	5	0.02826	0.005652	2.385	
Within (Error)	24	0.05688	0.00237		
Total	29	0.08514			
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	0.4792	0.4792		
2	32 %	0.525	0.525	-1.488	
3	45 %	0.56	0.56	-2.624	
4	56 %	0.562	0.562	-2.689	
5	75 %	0.5684	0.5684	-2.897	
6	100 %	0.5316	0.5316	-1.702	
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	32 %	5	0.07266	15.2	-0.0458	
3	45 %	5	0.07266	15.2	-0.0808	
4	56 %	5	0.07266	15.2	-0.0828	
5	75 %	5	0.07266	15.2	-0.0892	
6	100 %	5	0.07266	15.2	-0.0524	

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: September 18, 2012 at 0904

Date and Time Test Terminated: September 25, 2012 at 1430

Effluent Conc.: Control		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	6.8	6.5	6.2	6.2	6.7	6.3	7.6
	Final	6.2	5.9	5.9	5.7	6.8	5.8	6.2
pH, units	Initial	7.8	7.8	7.8	7.9	7.9	7.9	7.7
	Final	7.6	7.5	7.5	7.5	7.8	7.4	7.4
Alkalinity, mg CaCO ₃ /l		30	NA	30	NA	30	NA	NA
Hardness, mg CaCO ₃ /l		48	NA	47	NA	41	NA	NA
Conductivity, umhos/cm		130	150	160	140	140	140	160
Res. Chlorine, mg/l		<0.05	NA	<0.05	NA	<0.05	NA	NA

Effluent Conc.: 32 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	6.8	6.6	6.3	6.2	6.4	6.6	7.3
	Final	6.4	6.1	5.7	5.6	6.6	5.3	5.9
pH, units	Initial	7.2	7.5	7.6	7.5	7.8	7.9	7.3
	Final	7.4	7.7	7.5	7.5	7.8	7.3	7.3

Effluent Conc.: 45 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	6.7	6.6	6.2	6.3	6.4	6.5	7.2
	Final	6.4	6.1	5.4	5.9	6.3	5.6	5.8
pH, units	Initial	7.2	7.4	7.5	7.4	7.8	7.9	7.2
	Final	7.4	7.6	7.5	7.6	7.6	7.3	7.3

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: September 18, 2012 at 0904

Date and Time Test Terminated: September 25, 2012 at 1430

Effluent Conc.: 56 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	6.7	6.6	6.3	6.5	6.4	6.6	7.1
	Final	6.6	5.9	5.6	5.8	6.6	5.7	5.9
pH, units	Initial	7.1	7.4	7.4	7.4	7.8	8.0	7.1
	Final	7.6	7.5	7.5	7.6	7.8	7.4	7.4

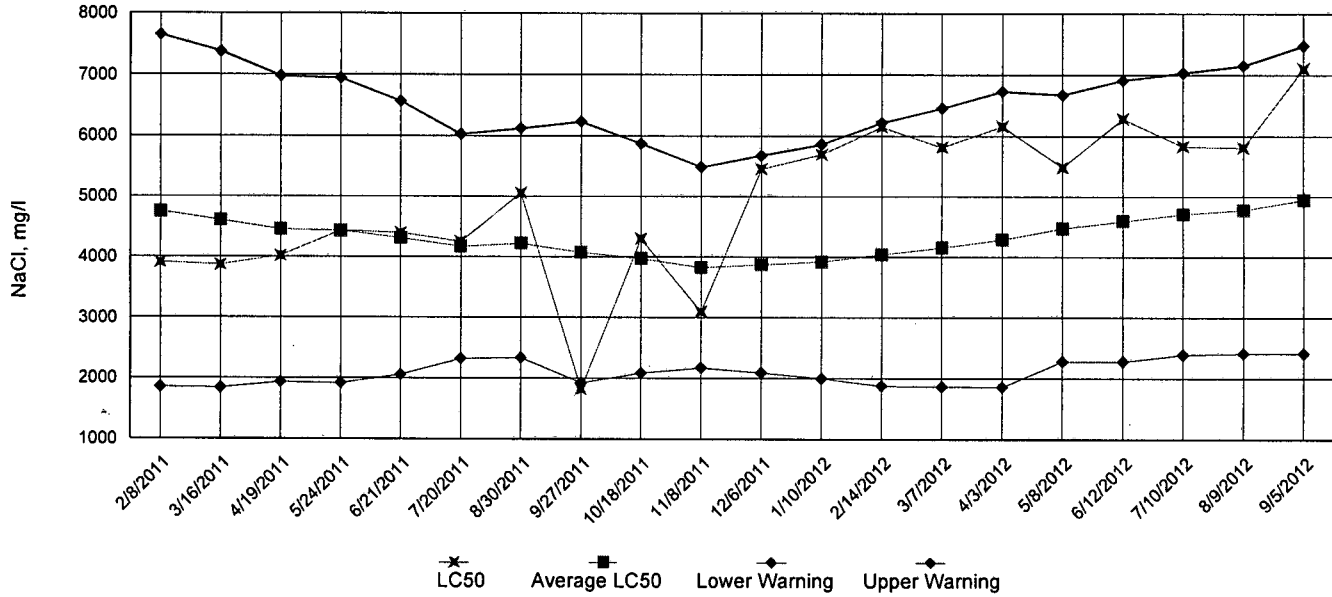
Effluent Conc.: 75 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	6.5	6.6	6.4	6.4	6.3	6.4	7.4
	Final	6.6	5.9	5.5	5.6	6.0	5.6	5.9
pH, units	Initial	7.0	7.3	7.4	7.2	7.8	8.0	7.0
	Final	7.6	7.5	7.5	7.5	7.6	7.3	7.4

Effluent Conc.: 100 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	6.4	6.5	6.5	6.1	6.5	6.6	8.8
	Final	6.6	5.9	5.6	5.5	5.9	5.5	6.1
pH, units	Initial	6.9	7.2	7.1	7.0	7.9	8.0	6.5
	Final	7.5	7.5	7.5	7.5	7.6	7.3	7.5
Alkalinity, mg CaCO ₃ /l		37	NA	34	NA	29	NA	NA
Hardness, mg CaCO ₃ /l		17	NA	17	NA	15	NA	NA
Conductivity, umhos/cm		700	840	840	730	710	690	830
Res. Chlorine, mg/l		<0.05	NA	<0.05	NA	<0.05	NA	NA

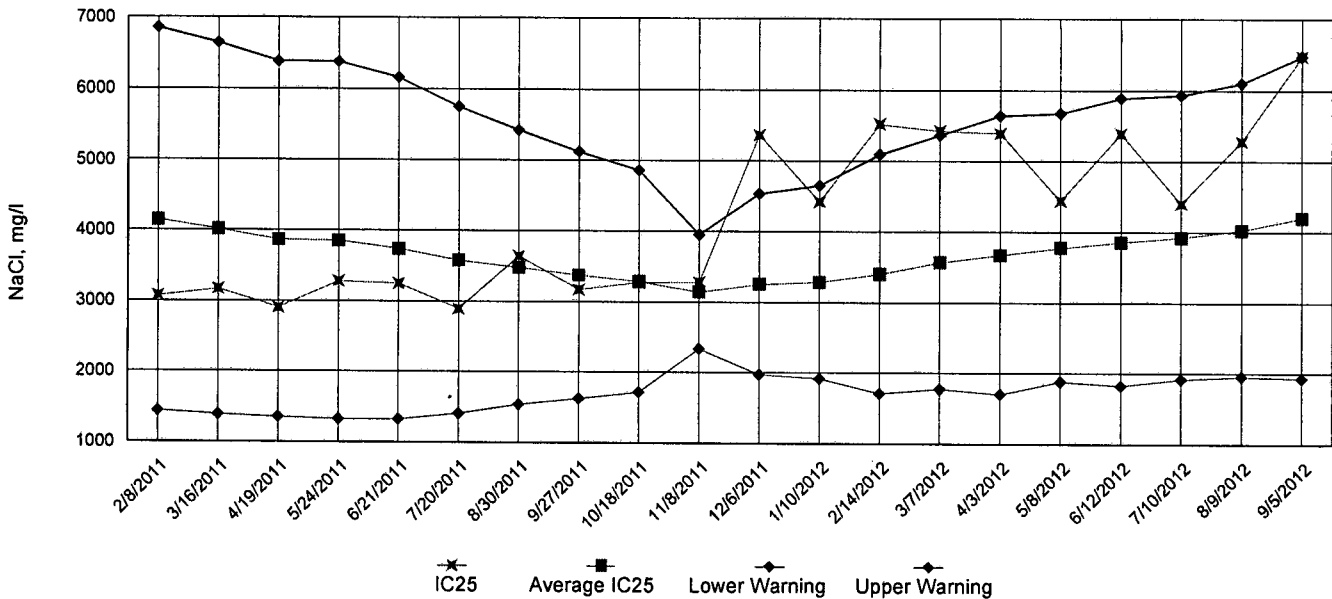
Appendix A4: Test 1000.0

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

LC50 Survival Data



IC25 Growth Data



Appendix B: Test 1000.0

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

Permittee: El Dorado Water Utilities

NPDES No.: AR0033723 AFIN No. 70-00341

Date and Time Test Initiated: September 18, 2012 at 1620

Date and Time Test Terminated: September 25, 2012 at 1430

Dilution water used: Synthetic Soft Water #3908

DATA TABLE FOR SURVIVAL

Effluent Conc. %	Percent Survival in replicate chambers					Mean percent survival			CV%
	A	B	C	D	E	24 hr	48 hr	7 days	
Control	100	100	100	87.5	100	100	100	97.5	5.73
32 %	100	100	100	100	87.5	100	97.5	97.5	5.73
45 %	100	100	100	100	100	100	100	100	0.00
56 %	100	100	100	100	100	100	100	100	0.00
75 %	100	100	100	100	100	100	100	100	0.00
100 %	100	100	100	100	100	100	100	100	0.00

DATA TABLE FOR GROWTH

Effluent Conc. %	Average dry weight, mg replicate chambers					Mean dry weight, mg	CV%
	A	B	C	D	E		
Control	0.458	0.435	0.549	0.459	0.495	0.479	9.29
32 %	0.571	0.506	0.544	0.504	0.500	0.525	5.95
45 %	0.539	0.545	0.505	0.621	0.590	0.56	8.14
56 %	0.599	0.558	0.586	0.475	0.592	0.562	9.09
75 %	0.539	0.586	0.540	0.589	0.588	0.568	4.65
100 %	0.551	0.430	0.638	0.544	0.495	0.532	14.4

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	(100 %)	<u> </u> YES	<u> X </u> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<u> </u> YES	<u> </u> 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	(100 %)	<u> </u> YES	<u> X </u> NO
b.) 1/2 LOW FLOW DILUTION	(NA)	<u> </u> YES	<u> </u> 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: 100 % (TOP6C)

6. LOEC Pimephales Lethality: 100 % (TXP6C)

7. NOEC Pimephales Sublethality: 100 % (TPP6C)

8. LOEC Pimephales Sublethality: 100 % (TYP6C)

9. Coefficient of variation for Pimephales growth: 14.4 (TQP6C)

Appendix B: Test 1000.0

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

PERMITTEE: El Dorado Water Utilities
NPDES NO.: AR0033723 AFIN No. 70-00341
CONTACT: Mr. Harold Baker
ANALYST: 275, 280, 298, 304

Test Initiated: DATE: September 18, 2012 TIME: 1620
Test Terminated: DATE: September 25, 2012 TIME: 1430

DILUTION	DAY						
	1	2	3	4	5	6	7
Control							
D.O. Initial	6.8	6.5	6.2	6.2	6.7	6.3	7.6
Final	6.2	5.9	5.9	5.7	6.8	5.8	6.2
pH Initial	7.8	7.8	7.8	7.9	7.9	7.9	7.7
Final	7.6	7.5	7.5	7.5	7.8	7.4	7.4
Alkalinity	30	NA	30	NA	30	NA	NA
Hardness	48	NA	47	NA	41	NA	NA
Conductivity	130	150	160	140	140	140	160
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
32 %							
D.O. Initial	6.8	6.6	6.3	6.2	6.4	6.6	7.3
Final	6.4	6.1	5.7	5.6	6.6	5.3	5.9
pH Initial	7.2	7.5	7.6	7.5	7.8	7.9	7.3
Final	7.4	7.7	7.5	7.5	7.8	7.3	7.3
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	320	370	370	330	320	310	380
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
45 %							
D.O. Initial	6.7	6.6	6.2	6.3	6.4	6.5	7.2
Final	6.4	6.1	5.4	5.9	6.3	5.6	5.8
pH Initial	7.2	7.4	7.5	7.4	7.8	7.9	7.2
Final	7.4	7.6	7.5	7.6	7.6	7.3	7.3
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	400	460	460	400	390	380	470
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
56 %							
D.O. Initial	6.7	6.6	6.3	6.5	6.4	6.6	7.1
Final	6.6	5.9	5.6	5.8	6.6	5.7	5.9
pH Initial	7.1	7.4	7.4	7.4	7.8	8.0	7.1
Final	7.6	7.5	7.5	7.6	7.8	7.4	7.4
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	460	530	530	470	450	440	540
Chlorine	NA	NA	NA	NA	NA	NA	NA

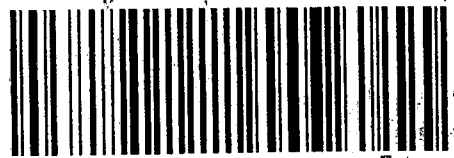
DILUTION	DAY						
	1	2	3	4	5	6	7
75 %							
D.O. Initial	6.5	6.6	6.4	6.4	6.3	6.4	7.4
Final	6.6	5.9	5.5	5.6	6.0	5.6	5.9
pH Initial	7.0	7.3	7.4	7.2	7.8	8.0	7.0
Final	7.6	7.5	7.5	7.5	7.6	7.3	7.4
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	560	660	660	580	560	540	660
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION	DAY						
	1	2	3	4	5	6	7
100 %							
D.O. Initial	6.4	6.5	6.5	6.1	6.5	6.6	8.8
Final	6.6	5.9	5.6	5.5	5.9	5.5	6.1
pH Initial	6.9	7.2	7.1	7.0	7.9	8.0	6.5
Final	7.5	7.5	7.5	7.5	7.6	7.3	7.5
Alkalinity	37	NA	34	NA	29	NA	NA
Hardness	17	NA	17	NA	15	NA	NA
Conductivity	700	840	840	730	710	690	830
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: <u>EL DORADO WATER UTILITIES</u>			PO No.		NO OF BOTTLES 3	ANALYSES REQUESTED										AIC CONTROL NO: <u>161015</u>			
Project Reference: <u>SOUTH EFFLUENT</u>			SAMPLE MATRIX			F.H. MINNOWS BIOMONITORING											AIC PROPOSAL NO:		
Project Manager: <u>HAROLD BAKER</u>			WATER														Carrier: <u>Fed-Ex</u>		
Sampled By: <u>JOHN M. PEPPERS</u>			G	C	A	S											Received Temperature C <u>2°C</u>		
AIC No.	Sample Identification	Date/Time Collected	R	O	T	E	S											Remarks	
<u>②</u>	<u>SE-1605</u>	<u>0930 9-19-12</u>																	
		Container Type											Field pH calibration						
		Preservative											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										
Turnaround Time Requested: (Please circle) <u>NORMAL</u> or EXPEDITED IN _____ DAYS					Relinquished By: <u>JOHN M. PEPPERS</u>		Date/Time <u>1600 9-19-12</u>		Received By: <u>FED EX</u>		Date/Time <u>1610 9-19-12</u>								
Expedited results requested by: _____					Relinquished By: <u>Fed-Ex</u>		Date/Time <u>9-20-12 8:00am</u>		Received in Lab By: <u>Sharon Pulia</u>		Date/Time <u>9-20-12 8:00am</u>								
Who should AIC contact with questions: <u>JOHN M. PEPPERS</u>					Comments: <u>8764 3753 6319</u>														
Phone: <u>870-814-1764</u> LAB # <u>870-862-0421</u>																			
Report Attention to: <u>HAROLD BAKER</u>																			
Report Address to: <u>P.O. Box 1587 EL DORADO, AR 71731</u>																			

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Water Division
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N. Little Rock, AR 72118*