



May 31, 2012
Control No. 157963-1
Page 1 of 31

May 31, 2012

Test Results of
Second Quarter
Chronic 7-Day Renewal
Biomonitoring Testing
for
Effluent
Mena, AR

Control No. 157963-1

Prepared for:

Mr. Mike Spencer
Mena Water and Sewer
323 County Road 53
Mena, AR 71953

Prepared by:

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



Mena Water and Sewer
ATTN: Mr. Mike Spencer
323 County Road 53
Mena, AR 71953

Re: Chronic 7-Day Renewal utilizing *Pimephales promelas* (Fathead minnow) and *Ceriodaphnia dubia*
Effluent - Mena, AR
NPDES Permit No. AR0036692 AFIN#5700042

Dear Mr. Mike Spencer:

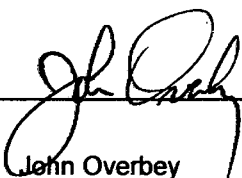
This report is the analytical results and supporting information for the samples submitted to American Interplex Corporation (AIC). The following results are applicable only to the sample identified by the control number referenced above. Accurate assessment of the data requires access to the entire 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.**

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: Mena Water and Sewer
ATTN: Mr. Mike Spencer
menawwtp@gmail.com

Table of Contents

I. Control Acceptance Criteria

II. Outlined Report

III. Data Analysis

IV. Standard Reference Toxicants

V. Chemical Analysis/Quality Control

VI. Organism History

VII. Results Summary

Pimephales promelas (Fathead minnow)

Ceriodaphnia dubia

Appendix A: Raw Data

A1: Test 1000.0

Pimephales promelas (Fathead minnow) Survival and Growth

Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

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%	100	PASS
Control Growth > or = 0.25 mg per Surviving minnow	0.447	PASS
Control Growth CV < or = 40%	9.94	PASS
Growth Minimum Significant Difference 12 to 30%	13.9	PASS
Critical Dilution CV < or = 40%	10.8	PASS

Ceriodaphnia dubia Method 1002.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	100	PASS
Control Reproduction > or = 15 per Surviving Female	25.4	PASS
Control CV < or = 40% per Surviving Female	9.13	PASS
Reproduction Minimum Significant Difference 13 to 47%	16.8	PASS
Critical Dilution CV < or = 40%	27.3	PASS

II. Outlined Report

A. Introduction

1. Permit Number: AR0036692 AFIN#5700042
2. Test Requirements: Chronic Biomonitoring, Quarterly
Test Methods 1000.0 and 1002.0
3. Receiving Stream: Ouachita River Basin

B. Source of Effluent/Dilution Water

1. Effluent Samples:
 - a. Sampling Point: Effluent
 - b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	7.9	7.8	7.5
pH (standard units)	6.6	6.5	7.0
Alkalinity (mg/l as CaCO ₃)	6.0	6.0	5.1
Hardness (mg/l as CaCO ₃)	27	26	28
Conductivity (umhos/cm)	120	99	140
Residual Chlorine (mg/l)	<0.05	<0.05	<0.05
Ammonia as N (mg/l)	0.38	0.35	0.51

2. Dilution Water Samples: Synthetic Laboratory Soft Water #3874

- a. Dates Prepared: May 11 through May 25, 2012
- b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	8.0	7.7	7.6
pH (standard units)	7.7	7.4	7.6
Alkalinity (mg/l as CaCO ₃)	31	31	31
Hardness (mg/l as CaCO ₃)	44	43	47
Conductivity (umhos/cm)	120	120	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 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: May 22, 2012 at 1610
Date & Time Test Terminated: May 29, 2012 at 1420
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: May 22, 2012 at 1425
Date & Time Test Terminated: May 29, 2012 at 1425
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. 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 May 8, 2012 at 1645 to May 15, 2012 at 1505

The results were as follows: (Control No. 157572-2.)

Survival LC-50: 5482.6 mg/l

Growth IC-25: 4443 mg/l

Growth PMSD: 18.7

Ceriodaphnia dubia

Chronic reference tests are performed monthly.

A chronic reference test was performed on May 8, 2012 at 1435 to May 15, 2012 at 1510

The results were as follows: (Control No. 157572-1.)

Survival LC-50: 1673 mg/l

Growth IC-25: 1086 mg/l

Growth PMSD: 31.2

V. Chemical Analysis/Quality Control

Parameter	Method	% Recovery	Relative % Difference
Alkalinity	SM 2320 B	NA	0.00
Hardness	EPA 200.7	99.3	1.38
pH	SM 4500-H+ B	99.3	0.407
Conductivity	EPA 120.1	91.6	1.55

VI. Organism History

Pimephales promelas (Fathead minnow)

Date: May 22, 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: May 22, 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

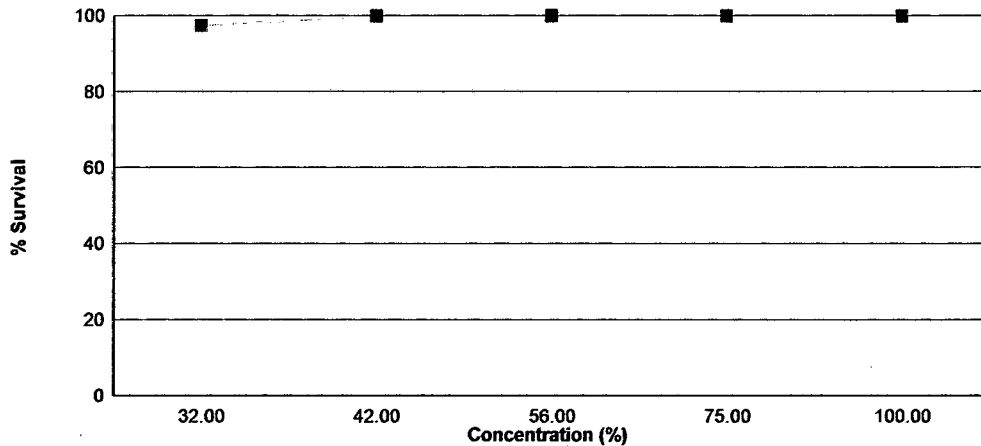
Larvae are exposed in a static renewal system for seven days to different concentrations of effluent with dilution water. Test results are based on the survival and growth (increase in weight) of the larvae.

Effluent dilutions for this test were 32 %, 42 %, 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 May 22, 2012 at 1610 and continued through May 29, 2012 at 1420. 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	100	0.447
32 %	97.5	0.476
42 %	100	0.483
56 %	100	0.480
75 %	100	0.504
100 %	100	0.469

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

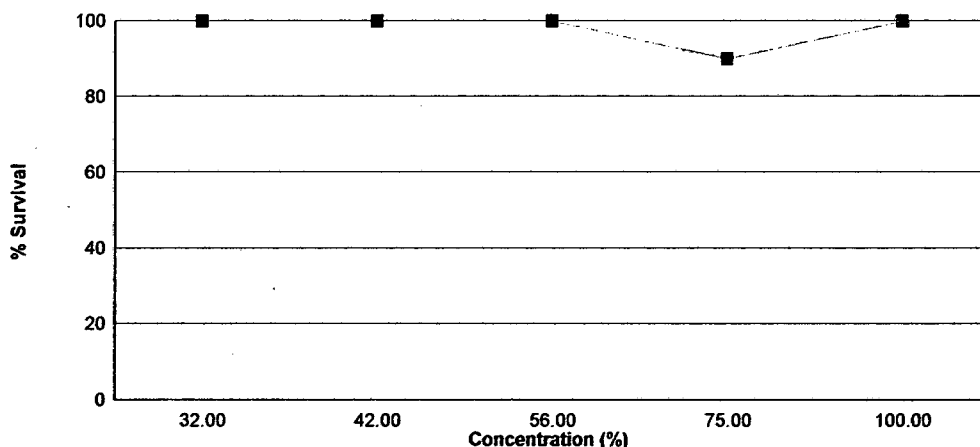
Neonates are exposed in a static renewal system to different concentrations of effluent with dilution water until 60% of surviving control organisms have three broods of offspring with an average of at least 15 young per female.

Effluent dilutions for this test were 32 %, 42 %, 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 May 22, 2012 at 1425 and continued through May 29, 2012 at 1425. 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	25.4
32 %	100	25.7
42 %	100	28.3
56 %	100	26.9
75 %	90.0	21.8
100 %	100	20.4

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Survival

Date and Time Test Initiated: May 22, 2012 at 1610

Date and Time Test Terminated: May 29, 2012 at 1420

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	7	7	7	7	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
42 %	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: May 22, 2012 at 1610
Test Terminated: May 29, 2012 at 1420

Drying Started: May 28, 2012 at 1846
Drying Ended: May 30, 2012 at 1235

Concentration	Replicate	Weight of pan	Weight of pan + fish	Total weight of fish (g)	Original # of fish	Mean dry weight (mg)
Control	A	.92078	.92426	0.00348	8	0.435
	B	.91680	.92000	0.00320	8	0.400
	C	.91709	.92042	0.00333	8	0.416
	D	.91810	.92217	0.00407	8	0.509
	E	.92056	.92435	0.00379	8	0.474
32 %	A	.92039	.92440	0.00401	8	0.501
	B	.91889	.92231	0.00342	8	0.428
	C	.91806	.92177	0.00371	8	0.464
	D	.91690	.92082	0.00392	8	0.490
	E	.91587	.91985	0.00398	8	0.498
42 %	A	.91929	.92312	0.00383	8	0.479
	B	.91969	.92281	0.00312	8	0.390
	C	.91951	.92328	0.00377	8	0.471
	D	.91929	.92355	0.00426	8	0.532
	E	.91842	.92278	0.00436	8	0.545
56 %	A	.91845	.92212	0.00367	8	0.459
	B	.91788	.92172	0.00384	8	0.480
	C	.91794	.92163	0.00369	8	0.461
	D	.91844	.92228	0.00384	8	0.480
	E	.91751	.92166	0.00415	8	0.519
75 %	A	.91968	.92355	0.00387	8	0.484
	B	.92068	.92458	0.00390	8	0.488
	C	.92125	.92533	0.00408	8	0.510
	D	.92342	.92741	0.00399	8	0.499
	E	.92307	.92740	0.00433	8	0.541
100 %	A	.92367	.92692	0.00325	8	0.406
	B	.92380	.92728	0.00348	8	0.435
	C	.92291	.92707	0.00416	8	0.520
	D	.92367	.92740	0.00373	8	0.466
	E	.92629	.93044	0.00415	8	0.519

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: May 22, 2012 at 1425

Date and Time Test Terminated: May 29, 2012 at 1425

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	0	0	0	0	0	0	2	1	0	0	3	10	0.300	
4	4	4	6	4	6	2	0	8	4	3	41	10	4.10	
5	0	10	8	7	9	9	8	0	8	8	67	10	6.70	
6	10	0	0	15	0	15	14	11	0	14	79	10	7.90	
7	11	14	13	0	13	0	0	0	13	0	64	10	6.40	
8														
TOTAL	25	28	27	26	28	26	24	20	25	25	254	10	25.4	

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	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	5	0	5	4	0	6	4	7	35	10	3.50	
5	8	8	8	8	11	10	8	0	8	0	69	10	6.90	
6	15	16	0	14	0	0	15	11	0	15	86	10	8.60	
7	0	0	14	0	16	18	0	9	10	0	67	10	6.70	
8														
TOTAL	27	24	27	22	32	32	23	26	22	22	257	10	25.7	

Concentration: 42 %														
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	1	0	1	2	10	0.200	
4	0	6	4	3	3	5	6	7	4	0	38	10	3.80	
5	8	10	8	9	11	12	0	0	9	9	76	10	7.60	
6	15	0	0	15	0	0	15	14	0	15	74	10	7.40	
7	0	9	13	1	15	13	16	11	14	1	93	10	9.30	
8														
TOTAL	23	25	25	28	29	30	37	33	27	26	283	10	28.3	

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: May 22, 2012 at 1425

Date and Time Test Terminated: May 29, 2012 at 1425

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	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	2	0	0	1	0	0	0	1	0	0	4	10	0.400
4	0	6	5	0	6	5	6	6	4	0	38	10	3.80
5	7	12	11	10	12	11	8	0	9	9	89	10	8.90
6	12	0	0	12	0	0	0	6	0	15	45	10	4.50
7	0	16	15	0	14	12	16	10	10	0	93	10	9.30
8													
TOTAL	21	34	31	23	32	28	30	23	23	24	269	10	26.9

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	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	X	0	0	0	0	1	0	2	3	9	0.333
4	0	4	X	4	3	6	5	4	4	0	30	9	3.33
5	9	10	X	8	8	9	10	0	9	8	71	9	7.89
6	12	0	X	11	0	0	0	9	0	13	45	9	5.00
7	0	12	X	0	11	14	11	10	11	9E	69	9	7.67
8													
TOTAL	21	26	0	23	22	29	26	24	24	23	218	10	21.8

E = Excluded fourth brood neonates

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	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	2	0	0	1	0	0	0	3	10	0.300
4	4	6	4	0	3	4	0	5	3	3	32	10	3.20
5	9	11	0	7	0	9	10	0	8	8	62	10	6.20
6	12	0	0	12	5	0	14	9	0	0	52	10	5.20
7	0	13	11	0	4	9	0	0	9	9	55	10	5.50
8													
TOTAL	25	30	15	21	12	22	25	14	20	20	204	10	20.4

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	0.87500	1.20940
2	32 %	3	1.00000	1.39310
2	32 %	4	1.00000	1.39310
2	32 %	5	1.00000	1.39310
3	42 %	1	1.00000	1.39310
3	42 %	2	1.00000	1.39310
3	42 %	3	1.00000	1.39310
3	42 %	4	1.00000	1.39310
3	42 %	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))
D = 0.027		
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	32 %	25.00	16.00	5.00	
3	42 %	27.50	16.00	5.00	
4	56 %	27.50	16.00	5.00	
5	75 %	27.50	16.00	5.00	
6	100 %	27.50	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 = 0.04134 W = 0.9707 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 = 5.749 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	0.008861	0.001772	1.029	
Within (Error)	24	0.04134	0.001722		
Total	29	0.0502			
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	0.4468	0.4468			
2	32 %	0.4762	0.4762	-1.12		
3	42 %	0.4834	0.4834	-1.395		
4	56 %	0.4798	0.4798	-1.257		
5	75 %	0.5044	0.5044	-2.195		
6	100 %	0.4692	0.4692	-0.8535		
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	0.06194	13.9	-0.0294		
3	42 %	5	0.06194	13.9	-0.0366		
4	56 %	5	0.06194	13.9	-0.033		
5	75 %	5	0.06194	13.9	-0.0576		
6	100 %	5	0.06194	13.9	-0.0224		

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
42 %	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 %	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.

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	42 %	10	0	
3	56 %	10	0	
4	75 %	10	1	
5	100 %	10	0	

Appendix A2: Statistics

Ceriodaphnia dubia Reproduction

Chi-Square Test for Normality	No Transformation
Chi-Square = 1.1368 Critical Chi-Square = 13.28	(alpha = 0.01, df = 4)
Data PASS normality test (alpha = 0.01).	

Kolmogorov Test for Normality	No Transformation
D = 0.1014 D* = 0.7956 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 = 13.57 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	461.8	92.36	3.595	
Within (Error)	54	1387	25.69		
Total	59	1849			
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	25.4	25.4			
2	32 %	25.7	25.7	-0.1324		
3	42 %	28.3	28.3	-1.279		
4	56 %	26.9	26.9	-0.6618		
5	75 %	21.8	21.8	1.588		
6	100 %	20.4	20.4	2.206		
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	5.236	20.6	-0.3		
3	42 %	10	5.236	20.6	-2.9		
4	56 %	10	5.236	20.6	-1.5		
5	75 %	10	5.236	20.6	3.6		
6	100 %	10	5.236	20.6	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	366.8	73.36	4.526	
Within (Error)	53	859.2	16.21		
Total	58	1226			
Critical F = 3.39 (alpha = 0.01, df = 5,53)					
2.39 (alpha = 0.05, df = 5,53)					
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	25.4	25.4			
2	32 %	25.7	25.7	-0.1666		
3	42 %	28.3	28.3	-1.611		
4	56 %	26.9	26.9	-0.8331		
5	75 %	24.222	24.222	0.6368		
6	100 %	20.4	20.4	2.777	*	
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	32 %	10	4.159	16.4	-0.3	
3	42 %	10	4.159	16.4	-2.9	
4	56 %	10	4.159	16.4	-1.5	
5	75 %	9	4.273	16.8	1.178	
6	100 %	10	4.159	16.4	5	

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: May 22, 2012 at 1048

Date and Time Test Terminated: May 29, 2012 at 1425

Effluent Conc.: Control	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
DO, mg/l	Initial	8.0	7.8	7.7	7.8	7.6	8.2	8.0
	Final *1	6.9	6.7	6.6	6.5	6.8	6.8	7.1
	Final *2	7.5	7.6	7.7	8.0	7.6	8.0	7.9
pH, units	Initial	7.7	7.6	7.4	7.7	7.6	7.7	7.8
	Final *1	7.5	7.6	7.5	7.4	7.6	7.7	7.8
	Final *2	8.2	7.9	8.2	7.8	7.7	7.9	8.1
Alkalinity, mg CaCO ₃ /l	31	NA	31	NA	31	NA	NA	
Hardness, mg CaCO ₃ /l	44	NA	43	NA	47	NA	NA	
Conductivity, umhos/cm	120	120	120	120	140	140	130	
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	7.9	7.7	7.5	7.6	8.1	7.9
	Final *1	7.3	6.8	6.6	6.7	6.7	6.6	7.0
	Final *2	7.9	7.9	7.5	7.6	6.9	8.0	7.9
pH, units	Initial	7.6	7.6	7.4	7.7	7.6	7.6	7.5
	Final *1	7.5	7.4	7.5	7.4	7.5	7.5	7.6
	Final *2	8.1	7.9	8.1	7.8	7.7	7.8	8.0

Effluent Conc.: 42 %	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	
DO, mg/l	Initial	8.2	7.9	7.7	7.8	7.8	8.1	7.8
	Final *1	7.2	6.8	6.6	6.6	6.4	6.4	7.1
	Final *2	7.8	7.8	7.8	7.7	7.0	8.2	7.9
pH, units	Initial	7.6	7.5	7.4	7.7	7.5	7.6	7.4
	Final *1	7.4	7.4	7.4	7.3	7.4	7.4	7.6
	Final *2	8.0	7.8	8.0	7.7	7.7	7.7	8.0

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: May 22, 2012 at 1048

Date and Time Test Terminated: May 29, 2012 at 1425

Effluent Conc.: 56 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.1	7.7	7.6	7.6	7.7	8.0	7.6
	Final *1	7.4	7.1	7.2	6.4	6.9	6.7	7.1
	Final *2	7.4	7.7	7.7	7.9	7.4	8.0	7.9
pH, units	Initial	7.5	7.5	7.4	7.7	7.4	7.6	7.3
	Final *1	7.4	7.4	7.3	7.2	7.4	7.4	7.5
	Final *2	8.0	7.8	8.0	7.7	7.6	7.7	8.0

Effluent Conc.: 75 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.0	7.9	7.6	7.7	7.4	8.2	7.7
	Final *1	7.3	7.4	6.8	6.6	6.7	6.6	7.1
	Final *2	7.6	7.6	7.6	7.8	7.3	8.1	7.8
pH, units	Initial	7.5	7.4	7.3	7.6	7.4	7.5	7.2
	Final *1	7.1	7.3	7.2	7.0	7.3	7.3	7.4
	Final *2	7.9	7.7	7.8	7.7	7.6	7.5	7.9

Effluent Conc.: 100 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.9	7.9	7.8	7.7	7.5	8.4	7.8
	Final *1	7.4	6.7	6.7	6.9	7.0	6.4	6.7
	Final *2	7.8	7.9	7.8	7.7	7.0	8.0	7.7
pH, units	Initial	6.6	6.5	6.5	7.1	7.0	7.3	6.9
	Final *1	6.5	6.9	7.0	7.6	7.2	7.2	7.2
	Final *2	7.6	7.4	7.5	7.5	7.4	7.3	7.7
Alkalinity, mg CaCO ₃ /l	6.0	NA	6.0	NA	5.1	NA	NA	NA
Hardness, mg CaCO ₃ /l	27	NA	26	NA	28	NA	NA	NA
Conductivity, umhos/cm	120	110	99	120	140	140	130	130
Res. Chlorine, mg/l	<0.05	NA	<0.05	NA	<0.05	NA	NA	NA

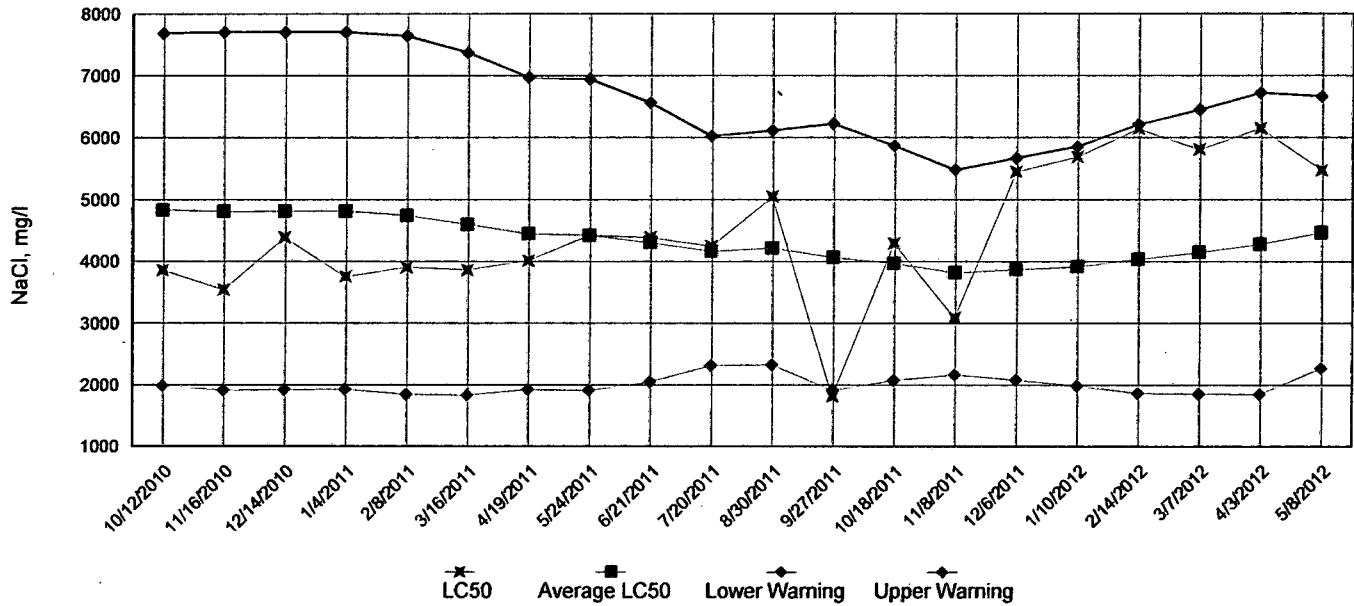
*1 = data from the *Pimephales promelas* (Fathead Minnow) test

*2 = data from the *Ceriodaphnia dubia* test

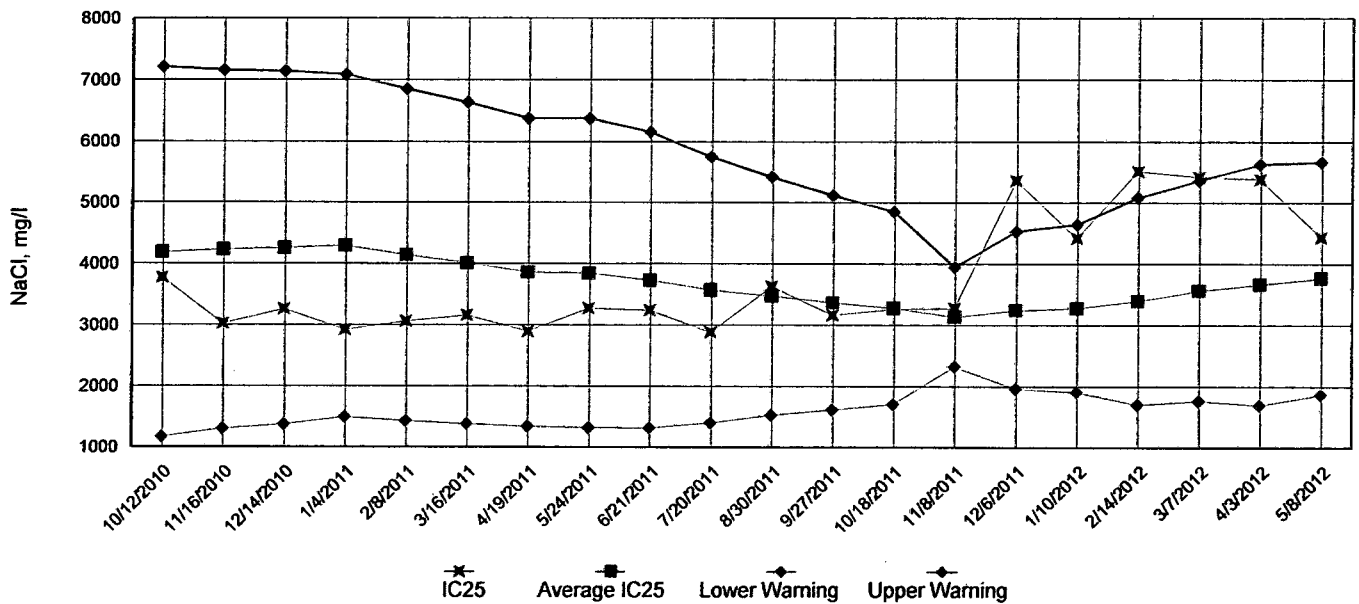
Appendix A4: Test 1000.0

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

LC50 Survival Data

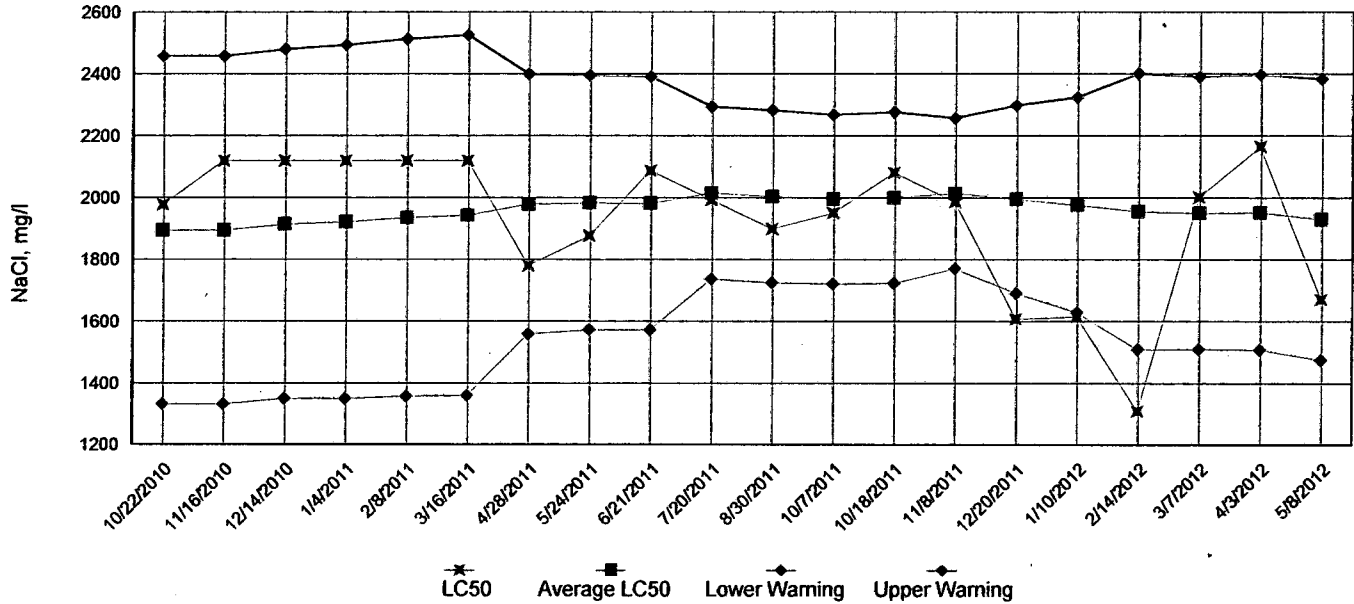


IC25 Growth Data

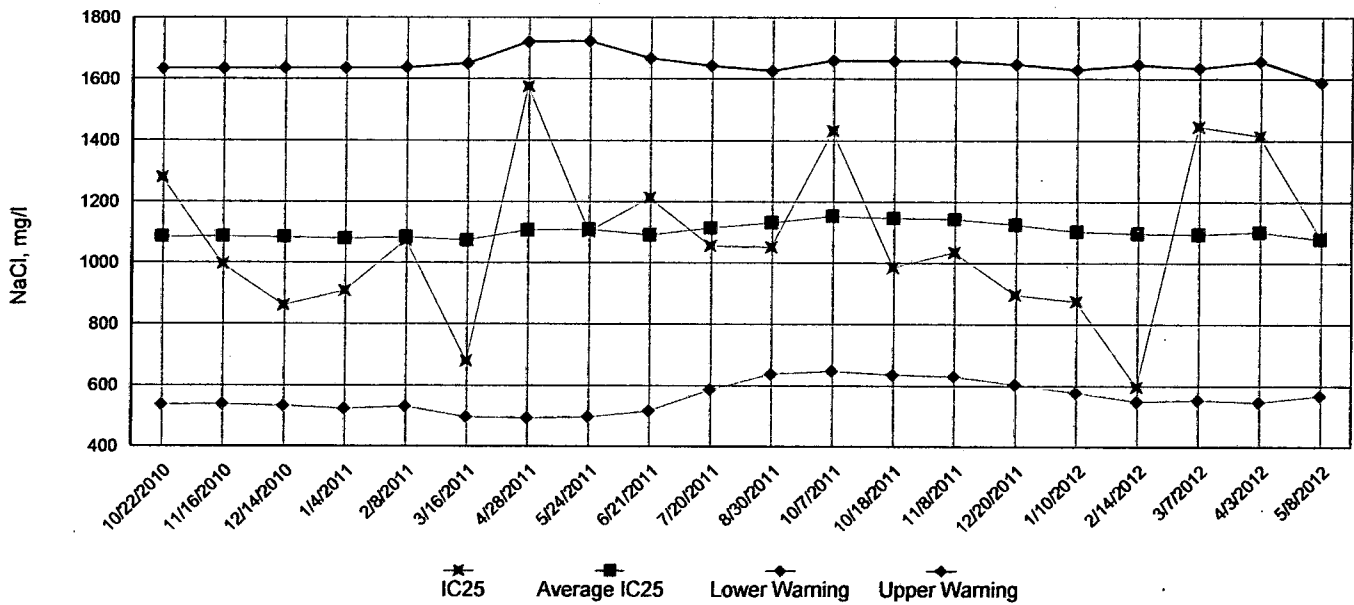


Appendix A4: Test 1002.0
Chronic Reference Toxicant, *Ceriodaphnia dubia*

LC50 Survival Data



IC25 Reproduction Data



Appendix B: Test 1000.0

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

Permittee: Mena Water and Sewer

NPDES No.: AR0036692 AFIN#5700042

Date and Time Test Initiated: May 22, 2012 at 1610

Date and Time Test Terminated: May 29, 2012 at 1420

Dilution water used: Synthetic Laboratory Soft Water #3874

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	87.5	100	100	100	100	100	97.5	5.73
42 %	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	0.435	0.400	0.416	0.509	0.474	0.447	9.94
32 %	0.501	0.428	0.464	0.490	0.498	0.476	6.43
42 %	0.479	0.390	0.471	0.532	0.545	0.483	12.7
56 %	0.459	0.480	0.461	0.480	0.519	0.48	5.02
75 %	0.484	0.488	0.510	0.499	0.541	0.504	4.53
100 %	0.406	0.435	0.520	0.466	0.519	0.469	10.8

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: 10.8 (TQP6C)

Appendix B: Test 1000.0

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

PERMITTEE: Mena Water and Sewer
NPDES NO.: AR0036692 AFIN#5700042
CONTACT: Mr. Mike Spencer
ANALYST: 275, 280, 298, 304

Test Initiated: DATE: May 22, 2012 TIME: 1610
Test Terminated: DATE: May 29, 2012 TIME: 1420

DILUTION Control	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	7.8	7.7	7.8	7.6	8.2	8.0
Final	6.9	6.7	6.6	6.5	6.8	6.8	7.1
pH Initial	7.7	7.6	7.4	7.7	7.6	7.7	7.8
Final	7.5	7.6	7.5	7.4	7.6	7.7	7.8
Alkalinity	31	NA	31	NA	31	NA	NA
Hardness	44	NA	43	NA	47	NA	NA
Conductivity	120	120	120	120	140	140	130
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	7.9	7.7	7.5	7.6	8.1	7.9
Final	7.3	6.8	6.6	6.7	6.7	6.6	7.0
pH Initial	7.6	7.6	7.4	7.7	7.6	7.6	7.5
Final	7.5	7.4	7.5	7.4	7.5	7.5	7.6
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	120	120	120	120	140	140	130
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 42 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.2	7.9	7.7	7.8	7.8	8.1	7.8
Final	7.2	6.8	6.6	6.6	6.4	6.4	7.1
pH Initial	7.6	7.5	7.4	7.7	7.5	7.6	7.4
Final	7.4	7.4	7.4	7.3	7.4	7.4	7.6
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	120	120	120	120	140	140	130
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 56 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.1	7.7	7.6	7.6	7.7	8.0	7.6
Final	7.4	7.1	7.2	6.4	6.9	6.7	7.1
pH Initial	7.5	7.5	7.4	7.7	7.4	7.6	7.3
Final	7.4	7.4	7.3	7.2	7.4	7.4	7.5
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	120	120	120	120	140	140	130
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 75 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	7.9	7.6	7.7	7.4	8.2	7.7
Final	7.3	7.4	6.8	6.6	6.7	6.6	7.1
pH Initial	7.5	7.4	7.3	7.6	7.4	7.5	7.2
Final	7.1	7.3	7.2	7.0	7.3	7.3	7.4
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	120	120	120	120	140	140	130
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 100 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.9	7.9	7.8	7.7	7.5	8.4	7.8
Final	7.4	6.7	6.7	6.9	7.0	6.4	6.7
pH Initial	6.6	6.5	6.5	7.1	7.0	7.3	6.9
Final	6.5	6.9	7.0	7.6	7.2	7.2	7.2
Alkalinity	6.0	NA	6.0	NA	5.1	NA	NA
Hardness	27	NA	26	NA	28	NA	NA
Conductivity	120	110	99	120	140	140	130
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: Mena Water and Sewer

NPDES No.: AR0036692 AFIN#5700042

Date and Time Test Initiated: May 22, 2012 at 1425

Date and Time Test Terminated: May 29, 2012 at 1425

Dilution water used: Synthetic Laboratory Soft Water #3874

PERCENT SURVIVAL

Time of Reading	Control	Percent Effluent				
		32 %	42 %	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	90.0	100

NUMBER OF YOUNG PRODUCED PER FEMALE @ 7 DAYS

Replicates	Control	Percent Effluent				
		32 %	42 %	56 %	75 %	100 %
A	25	27	23	21	21	25
B	28	24	25	34	26	30
C	27	27	25	31	0	15
D	26	22	28	23	23	21
E	28	32	29	32	22	12
F	26	32	30	28	29	22
G	24	23	37	30	26	25
H	20	26	33	23	24	14
I	25	22	27	23	24	20
J	25	22	26	24	23	20
Mean per Adult	25.4	25.7	28.3	26.9	21.8	20.4
Mean per Surviving Adult	25.4	25.7	28.3	26.9	24.2	20.4
CV %	9.13	15.0	14.8	17.2	10.1	27.3

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	(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: 27.3 (TQP3B)

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

PERMITTEE: Mena Water and Sewer
NPDES NO.: AR0036692 AFIN#5700042
CONTACT: Mr. Mike Spencer
ANALYST: 275, 280, 298, 304

Test Initiated: DATE: May 22, 2012 TIME: 1425
Test Terminated: DATE: May 29, 2012 TIME: 1425

DILUTION Control	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	7.8	7.7	7.8	7.6	8.2	8.0
Final	7.5	7.6	7.7	8.0	7.6	8.0	7.9
pH Initial	7.7	7.6	7.4	7.7	7.6	7.7	7.8
Final	8.2	7.9	8.2	7.8	7.7	7.9	8.1
Alkalinity	31	NA	31	NA	31	NA	NA
Hardness	44	NA	43	NA	47	NA	NA
Conductivity	120	120	120	120	140	140	130
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	7.9	7.7	7.5	7.6	8.1	7.9
Final	7.9	7.9	7.5	7.6	6.9	8.0	7.9
pH Initial	7.6	7.6	7.4	7.7	7.6	7.6	7.5
Final	8.1	7.9	8.1	7.8	7.7	7.8	8.0
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	120	120	120	120	140	140	130
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 42 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.2	7.9	7.7	7.8	7.8	8.1	7.8
Final	7.8	7.8	7.8	7.7	7.0	8.2	7.9
pH Initial	7.6	7.5	7.4	7.7	7.5	7.6	7.4
Final	8.0	7.8	8.0	7.7	7.7	7.7	8.0
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	120	120	120	120	140	140	130
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 56 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.1	7.7	7.6	7.6	7.7	8.0	7.6
Final	7.4	7.7	7.7	7.9	7.4	8.0	7.9
pH Initial	7.5	7.5	7.4	7.7	7.4	7.6	7.3
Final	8.0	7.8	8.0	7.7	7.6	7.7	8.0
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	120	120	120	120	140	140	130
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 75 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	8.0	7.9	7.6	7.7	7.4	8.2	7.7
Final	7.6	7.6	7.6	7.8	7.3	8.1	7.8
pH Initial	7.5	7.4	7.3	7.6	7.4	7.5	7.2
Final	7.9	7.7	7.8	7.7	7.6	7.5	7.9
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	120	120	120	120	140	140	130
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 100 %	DAY						
	1	2	3	4	5	6	7
D.O. Initial	7.9	7.9	7.8	7.7	7.5	8.4	7.8
Final	7.8	7.9	7.8	7.7	7.0	8.0	7.7
pH Initial	6.6	6.5	6.5	7.1	7.0	7.3	6.9
Final	7.6	7.4	7.5	7.5	7.4	7.3	7.7
Alkalinity	6.0	NA	6.0	NA	5.1	NA	NA
Hardness	27	NA	26	NA	28	NA	NA
Conductivity	120	110	99	120	140	140	130
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

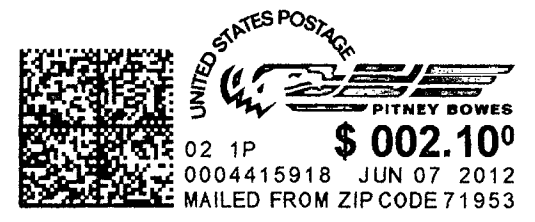
CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: MENA			PO No.		No of BOTTLES 3	Analyses Requested										AIC Control No: 157963			
Project Reference: MENA WWTP			Sample Matrix													AIC Proposal No:			
Project Manager: MIKE SPENCER			WATER SOIL													Carrier: UPS			
Sampled By: SPF			GRA COMP													Received Temperature °C 2			
AIC No.	Sample Identification	Date/Time Collected	G	C	W	S	Flea Sub Lett											Remarks	
1	EFF			X														Core + Time 5-21-12 / 1200	
Container Type			Preservative												Field pH calibration on _____ @ _____				
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				Buffer:				
Turnaround Time Requested: (Please circle) NORMAL or EXPEDITED IN _____ DAYS					Relinquished By: [Signature]			Date/Time: 21 MAY 2012 1230			Received By: Office Store			Date/Time: 21 MAY 2012 1230					
Expedited results requested by: _____					Relinquished By: _____			Date/Time: _____			Received in Lab By: [Signature]			Date/Time: 5-22-12 0930					
Who should AIC contact with questions: _____					Comments: 12WFO 66 0141966 534														
Phone: _____ Fax: _____																			
Report Attention to: _____																			
Report Address to: _____																			

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: MENA			PO No.		No of BOTTLES 3	Analyses Requested										AIC Control No: 157963						
Project Reference: MENA WWTP			Sample Matrix													AIC Proposal No:						
Project Manager: MIKE SPENCER			WATER SOIL													Carrier: UPS						
Sampled By: JEFF			G R A B	C O M P	W A T E R	S O I L											Received Temperature °C 20c					
AIC No.	Sample Identification	Date/Time Collected															Remarks					
2	EFF	1200 23 MAY 12		X																		
			Container Type												Field pH calibration on _____ @ _____							
			Preservative												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) NORMAL or EXPEDITED IN _____ DAYS					Relinquished By: [Signature]		Date/Time 23 MAY 12 12:30		Received By: OFFICE STORE		Date/Time 23 MAY 12 12:30											
Expedited results requested by: _____					Relinquished By:		Date/Time		Received in Lab By: [Signature]		Date/Time 5-24-12 9:45a											
Who should AIC contact with questions: _____					Comments: UPS# 12WFO6660141966785																	
Phone: _____ Fax: _____																						
Report Attention to: _____																						
Report Address to: _____																						

MENA WWTP
323 Dolk 53
MENA AR
71953



ADEP
5301 NORTH SHORE DR
(ATTN WATER DIVISION)
NORTH LITTLE ROCK AR
72118