DOING OUR BEST
MALVERN WATER WORKS
FOR YOU

506 Overman Street
P.O. Box 638
Malvern Arkansas 72104

501 332-3634, Phone
501 332-5730, Facsimile

10/05/2015

ADEQ
NPDES Enforcement Section
5301 Northshore Dr.
North Little Rock, AR 72118-5317

Re: Permit Number AR0034126

In response to the 6 DMR Exemptions for Flow and 3 Exemptions each for TSS, DO, Fecal, pH, CL_2, NH_3, CBOD5

Due to the senior plant operator being out with a leg injury, and the assistant operator quitting on September 1, plus the person who had run test before the assistant position was created two years ago had a death in the family, the decision was made by the senior operator to shut the plant down. Due to these circumstances, 6 exemptions were made for flow and 3 each for TSS, DO, Fecal, pH, CL_2, NH_3, and CBOD5

Sincerely,

Carl Wheatley
Wastewater Supervisor

Sanitary Sewer Overflow Monthly Report

Facility Name: Malvern Water Works **Permit Number:** AR0034126 **Reporting Period (Month/Year):** 09/2015

☑ No Sanitary Sewer Overflows This Monitoring Period

Summary Report Code Descriptions

Cause(s) of SSO		SSO Impact	Action(s) Taken	Ultimate Discharge Location
CO-Construction	D-Debris	NEAH-No Evidence of Adverse Health or Environmental Impact	WO-Work Order	CR-Creek/Stream/River (Please Specify)
E-Equipment Failure	G-Grease	OEHC-Observed or Evidence of Human Contact	EC-Environmental Cleanup	DI-Ditch
HC-Hydro Clean	LF-Line Failure Break	EFK-Evidence of Fish Kill	HC-Hydro Cleaned	DR-Drop Inlet
R-Rainfall	RG-Roots & Grease		HR-Hand Rodded	GR-Ground Surface
RO-Roots	V-Vandalism		EN-Referred to Engineering	PA-Paved Area
			PN-Public Notification	CB-Contained in Building

Description

Location	Manhole #	Start Date of SSO	End Date of SSO	Estimated Volume (in gallons)	Cause of SSO	Environmental Impact	Action(s) Taken to Address SSO	Ultimate Discharge Location

Signature of Cognizant or Ranking Official

10/5/2015
Date

"I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violation."

AMERICAN INTERPLEX CORPORATION
LABORATORIES

August 14, 2015

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

Control No. 192931-1

Prepared for:

Mr. John Davis
Malvern Water Works
506 Overman
Malvern, AR 72104

Prepared by:

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

AMERICAN INTERPLEX CORPORATION
LABORATORIES

Malvern Water Works
ATTN: Mr. John Davis
506 Overman
Malvern, AR 72104

Re: Chronic 7-Day Renewal utilizing *Pimephales promelas* (Fathead minnow) and *Ceriodaphnia dubia*
- Outfall 001
NPDES Permit No. AR0034126 AFIN 30-00040

Dear Mr. John Davis:

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 8.5 % effluent, which is above the critical dilution of 6.5 %. The NOEC for growth occurred at 8.5 % effluent, which is above the critical dilution of 6.5 %. **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 8.5 % effluent, which is above the critical dilution of 6.5 %. The NOEC for reproduction occurred at 8.5 % effluent, which is above the critical dilution of 6.5 %. **The sample, therefore, PASSED both lethal and sub-lethal effects for the *Ceriodaphnia dubia* test.**

AMERICAN INTERPLEX CORPORATION

John Overbey
Laboratory Director

PDF cc: Malvern Water Works
ATTN: Mr. John Davis
jdavis@malvernar.gov

Malvern Water Works
ATTN: Mr. Carl Wheatley
cwheatley@malvernar.gov

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I. Control Acceptance Criteria

Pimephales promelas (Fathead minnow) Method 1000.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	95.0	PASS
Control Growth > or = 0.25 mg per Surviving minnow	0.374	PASS
Control Growth CV < or = 40%	9.08	PASS
Growth Minimum Significant Difference 12 to 30%	28.1	PASS
Critical Dilution CV < or = 40%	35.5	PASS

Ceriodaphnia dubia Method 1002.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	100	PASS
Control Reproduction > or = 15 per Surviving Female	27.3	PASS
Control CV < or = 40% per Surviving Female	18.0	PASS
Reproduction Minimum Significant Difference 13 to 47%	25.2	PASS
Critical Dilution CV < or = 40%	20.7	PASS

II. Outlined Report

A. Introduction

1. Permit Number: AR0034126 AFIN 30-00040
2. Test Requirements:
   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:
   b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	6.8	7.3	6.7
pH (standard units)	7.6	7.8	7.5
Alkalinity (mg/l as CaCO3)	26	26	24
Hardness (mg/l as CaCO3)	31	30	29
Conductivity (umhos/cm)	140	140	180
Residual Chlorine (mg/l)	<0.05	<0.05	<0.05
Ammonia as N (mg/l)	0.68	0.16	<0.1

2. Dilution Water Samples: Synthetic Soft Water #4238
   a. Dates Prepared: July 23 through August 6, 2015
   b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	8.0	7.6	7.7
pH (standard units)	7.6	8.2	7.8
Alkalinity (mg/l as CaCO3)	30	30	30
Hardness (mg/l as CaCO3)	42	42	42
Conductivity (umhos/cm)	130	130	170
Residual Chlorine (mg/l)	<0.05	<0.05	<0.05

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

Pimephales promelas (Fathead minnow) Survival and Growth Method 1000.0

Date & Time Test Initiated:	August 4, 2015 at 1620
Date & Time Test Terminated:	August 11, 2015 at 1550
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:	August 4, 2015 at 1545
Date & Time Test Terminated:	August 11, 2015 at 1450
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 and Bartlett's test. 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. Steel's Many-One Rank test was used to determine the No Observable Effects Concentration (NOEC) for growth. Dunnett's Test was used to calculate the PMSD.

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

IV. Standard Reference Toxicants

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

Pimephales promelas (Fathead minnow)

Chronic reference tests are performed monthly.
A chronic reference test was performed on July 7, 2015 at 1550 to July 14, 2015 at 1410
The results were as follows: (Control No. 192203-1.)
Survival LC-50: 3488 mg/l
Growth IC-25: 2351 mg/l
Growth PMSD: 21

Ceriodaphnia dubia

Chronic reference tests are performed monthly.
A chronic reference test was performed on July 7, 2015 at 1615 to July 14, 2015 at 1415
The results were as follows: (Control No. 192203-2.)
Survival LC-50: 2035 mg/l
Growth IC-25: 1481 mg/l
Growth PMSD: 19.8

V. Chemical Analysis/Quality Control

Parameter	Method	% Recovery	Relative % Difference
Alkalinity	SM 2320 B	NA	1.57
Hardness	EPA 200.7	99.0	0.200
pH	SM 4500-H+ B	102	0.133
Conductivity	EPA 120.1	91.8	0.743

VI. Organism History

Pimephales promelas (Fathead minnow)

Date: August 4, 2015
Age: <24 hours
Source: In-house culture
Water Chemistry Record:
Alkalinity: 57-64 mg/l
Hardness: 80-100 mg/l
Temperature: 25 deg.C

Ceriodaphnia dubia

Date: August 4, 2015
Age: <24 hours
Source: In-house culture
Water Chemistry Record:
Alkalinity: 57-64 mg/l
Hardness: 80-100 mg/l
Temperature: 25 deg.C

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

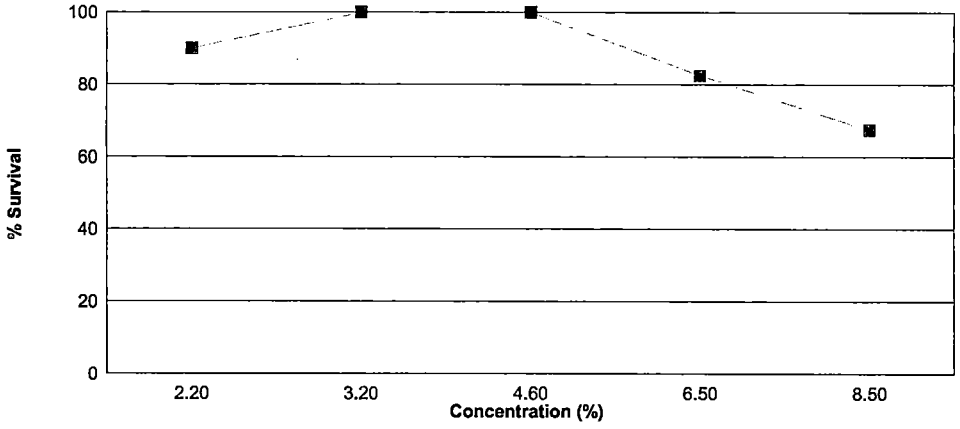
Larvae are exposed in a static renewal system for seven days to different concentrations of effluent with dilution water. Test results are based on the survival and growth (increase in weight) of the larvae.

Effluent dilutions for this test were 2.2 %, 3.2 %, 4.6 %, 6.5 %, 8.5 % in accordance with the NPDES permit.

The low flow or 'critical' dilution is specified in the NPDES permit as 6.5 % effluent.

The test was initiated on August 4, 2015 at 1620 and continued through August 11, 2015 at 1550. Statistical analyses were performed on the observed data and the no observable effects concentrations (NOECs) were as follows:

a.) NOEC survival = 8.5 % effluent
b.) NOEC growth = 8.5 % effluent



Summary of the 7-day Fathead Minnow Survival and Growth		
Concentration	Percent Survival	Mean Growth (mg)
Control	95.0	0.355
2.2 %	90.0	0.354
3.2 %	100	0.353
4.6 %	100	0.403
6.5 %	82.5	0.302
8.5 %	67.5	0.245

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

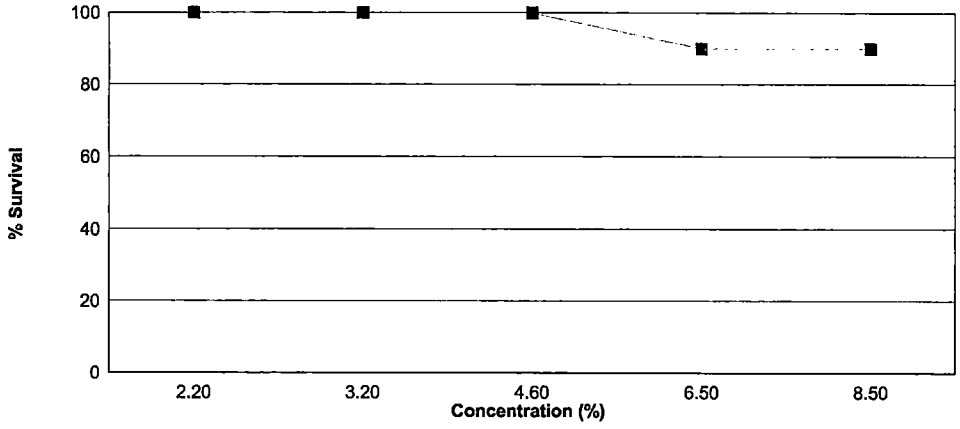
Neonates are exposed in a static renewal system to different concentrations of effluent with dilution water until 60% of surviving control organisms have three broods of offspring with an average of at least 15 young per female.

Effluent dilutions for this test were 2.2 %, 3.2 %, 4.6 %, 6.5 %, 8.5 % in accordance with the NPDES permit.

The low flow or 'critical' dilution is specified in the NPDES permit as 6.5 % effluent.

The test was initiated on August 4, 2015 at 1545 and continued through August 11, 2015 at 1450. Statistical analyses were performed on the observed data and the no observable effects concentrations (NOECs) were as follows:

a.) NOEC survival = 8.5 % effluent
b.) NOEC reproduction = 8.5 % effluent



Summary of the 7-day *Ceriodaphnia dubia* Survival and Reproduction Data		
Concentration	Percent Survival	Mean Reproduction
Control	100	27.3
2.2 %	100	26.1
3.2 %	100	24.3
4.6 %	100	24.1
6.5 %	90.0	22.8
8.5 %	90.0	22.5

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Survival

Date and Time Test Initiated: August 4, 2015 at 1620
Date and Time Test Terminated: August 11, 2015 at 1550

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	7	7	7	7	7
	C	8	8	7	7	7	7	7
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
2.2 %	A	8	8	8	8	8	8	8
	B	8	8	8	6	6	6	6
	C	8	8	8	8	7	7	7
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	7	7
3.2 %	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
4.6 %	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	8	8	8	8	8	8
6.5 %	A	8	7	7	7	6	6	6
	B	8	8	8	8	8	8	8
	C	8	8	7	7	7	7	7
	D	8	8	6	6	6	5	4
	E	8	8	8	8	8	8	8
8.5 %	A	8	8	8	8	8	8	8
	B	8	7	7	7	6	6	6
	C	8	8	7	5	5	5	5
	D	8	8	6	5	5	5	5
	E	8	8	8	6	5	3	3

Appendix A1: Test 1000.0

Pimephales promelas (Fathead Minnow) 7-Day Growth

Test Initiated: August 4, 2015 at 1620
Test Terminated: August 11, 2015 at 1550

Drying Started: August 10, 2015 at 1620
Drying Ended: August 12, 2015 at 1530

Concentration	Replicate	Weight of pan	Weight of pan + fish	Total weight of fish (g)	Original # of fish	Mean dry weight (mg)
Control	A	.94356	.94626	0.00270	8	0.338
	B	.93895	.94212	0.00317	8	0.396
	C	.94393	.94667	0.00274	8	0.342
	D	.94014	.94320	0.00306	8	0.382
	E	.93791	.94046	0.00255	8	0.319
2.2 %	A	.93235	.93507	0.00272	8	0.340
	B	.93380	.93564	0.00184	8	0.230
	C	.93506	.93834	0.00328	8	0.410
	D	.93669	.93968	0.00299	8	0.374
	E	.94313	.94644	0.00331	8	0.414
3.2 %	A	.94128	.94404	0.00276	8	0.345
	B	.94129	.94378	0.00249	8	0.311
	C	.93957	.94276	0.00319	8	0.399
	D	.93829	.94125	0.00296	8	0.370
	E	.93660	.93933	0.00273	8	0.341
4.6 %	A	.93744	.94064	0.00320	8	0.400
	B	.94070	.94384	0.00314	8	0.392
	C	.94516	.94834	0.00318	8	0.398
	D	.94593	.94927	0.00334	8	0.418
	E	.94694	.95019	0.00325	8	0.406
6.5 %	A	.93639	.93861	0.00222	8	0.278
	B	.93776	.94109	0.00333	8	0.416
	C	.93809	.94092	0.00283	8	0.354
	D	.93942	.94048	0.00106	8	0.132
	E	.94353	.94618	0.00265	8	0.331
8.5 %	A	.94289	.94573	0.00284	8	0.355
	B	.94089	.94339	0.00250	8	0.312
	C	.94095	.94258	0.00163	8	0.204
	D	.94176	.94344	0.00168	8	0.210
	E	.93964	.94079	0.00115	8	0.144

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: August 4, 2015 at 1545
Date and Time Test Terminated: August 11, 2015 at 1450

Concentration: Control													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	0	0	10	0.00
4	4	2	5	2	3	5	5	5	4	4	39	10	3.90
5	0	12	7	8	13	9	12	11	11	11	94	10	9.40
6	10	0	0	0	0	0	0	0	0	0	10	10	1.00
7	10	15	16	5	17	14	12	15	12	14	130	10	13.0
8													
TOTAL	24	29	28	15	33	28	29	31	27	29	273	10	27.3

Concentration: 2.2 %													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	0	0	10	0.00
4	2	5	3	4	5	5	3	3	5	4	39	10	3.90
5	0	9	6	10	12	10	9	9	7	7	79	10	7.90
6	10	0	0	0	0	0	0	0	5	0	15	10	1.50
7	16	16	15	14	18	17	8	12	15E	12	128	10	12.8
8													
TOTAL	28	30	24	28	35	32	20	24	17	23	261	10	26.1

E = Excluded fourth brood neonates

Concentration: 3.2 %													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	0	0	10	0.00
4	3	3	3	2	2	4	3	3	9	0	32	10	3.20
5	8	9	8	4	9	8	7	8	8	0	69	10	6.90
6	0	0	0	2	0	0	0	0	0	1	3	10	0.300
7	18	16	13	12	16	13	16	16	18	1	139	10	13.9
8													
TOTAL	29	28	24	20	27	25	26	27	35	2	243	10	24.3

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: August 4, 2015 at 1545
Date and Time Test Terminated: August 11, 2015 at 1450

Concentration: 4.6 %													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	0	0	0	0	0	0	0	0	0	0	0	10	0.00
2	0	0	0	0	0	0	0	0	0	0	0	10	0.00
3	0	0	0	0	0	0	0	0	0	0	0	10	0.00
4	2	1	0	2	4	4	3	3	5	4	28	10	2.80
5	6	0	9	10	10	5	7	6	9	0	62	10	6.20
6	0	0	0	0	0	0	0	0	0	13	13	10	1.30
7	13	0	17	19	15	18	13	15	14	14	138	10	13.8
8													
TOTAL	21	1	26	31	29	27	23	24	28	31	241	10	24.1

Concentration: 6.5 %													
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	X	0	0	0	0	0	9	0.00
4	1	2	4	3	3	X	4	0	4	3	24	9	2.67
5	0	10	7	6	12	X	11	8	11	8	73	9	8.11
6	0	0	0	0	0	X	0	0	0	0	0	9	0.00
7	12	14	15	15	13	X	14	15	16	17	131	9	14.6
8													
TOTAL	13	26	26	24	28	0	29	23	31	28	228	10	22.8

Concentration: 8.5 %													
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	X	0	0	0	0	0	9	0.00
4	3	1	3	3	2	X	5	3	3	3	26	9	2.89
5	4	7	3	7	9	X	11	6	10	8	65	9	7.22
6	2	0	0	0	0	X	0	0	0	0	2	9	0.222
7	12	16	13	17	14	X	15	17	15	13	132	9	14.7
8													
TOTAL	21	24	19	27	25	0	31	26	28	24	225	10	22.5

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	0.87500	1.20940
1	Control	3	0.87500	1.20940
1	Control	4	1.00000	1.39310
1	Control	5	1.00000	1.39310
2	2.2 %	1	1.00000	1.39310
2	2.2 %	2	0.75000	1.04720
2	2.2 %	3	0.87500	1.20940
2	2.2 %	4	1.00000	1.39310
2	2.2 %	5	0.87500	1.20940
3	3.2 %	1	1.00000	1.39310
3	3.2 %	2	1.00000	1.39310
3	3.2 %	3	1.00000	1.39310
3	3.2 %	4	1.00000	1.39310
3	3.2 %	5	1.00000	1.39310
4	4.6 %	1	1.00000	1.39310
4	4.6 %	2	1.00000	1.39310
4	4.6 %	3	1.00000	1.39310
4	4.6 %	4	1.00000	1.39310
4	4.6 %	5	1.00000	1.39310
5	6.5 %	1	0.75000	1.04720
5	6.5 %	2	1.00000	1.39310
5	6.5 %	3	0.87500	1.20940
5	6.5 %	4	0.50000	0.78540
5	6.5 %	5	1.00000	1.39310
6	8.5 %	1	1.00000	1.39310
6	8.5 %	2	0.75000	1.04720
6	8.5 %	3	0.62500	0.91174
6	8.5 %	4	0.62500	0.91174
6	8.5 %	5	0.37500	0.65906

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Survival

Shapiro - Wilk's Test for Normality		Transform: Arc Sin(Square Root(Y))
D = 0.6773		
W = 0.934		
Critical W = 0.9	(alpha = 0.01, N = 30)	
Critical W = 0.927	(alpha = 0.05, N = 30)	
Data PASS normality test (alpha = 0.01).		

Bartlett's Test for Homogeneity of Variance	Transform: Arc Sin(Square Root(Y))
Test can not be performed because at least one group has zero variance. Data FAIL to meet homogeneity of variance assumption.	

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	2.2 %	24.00	16.00	5.00	
3	3.2 %	32.50	16.00	5.00	
4	4.6 %	32.50	16.00	5.00	
5	6.5 %	23.00	16.00	5.00	
6	8.5 %	18.50	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
D = 0.1073		
W = 0.9465		
Critical W = 0.9	(alpha = 0.01, N = 30)	
Critical W = 0.927	(alpha = 0.05, N = 30)	
Data PASS normality test (alpha = 0.01).		

Bartlett's Test for Homogeneity of Variance		No Transformation
Calculated B1 statistic = 18.25		
Critical B = 15.086	(alpha = 0.01, df = 5)	
Data FAIL B1 homogeneity test at 0.01 level.		

Steel's Many-One Rank Test — No Transformation

Ho:Control<Treatment

Group	Identification	Rank Sum	Critical Value	DF	Sig 0.05
1	Control				
2	2.2 %	30.00	16.00	5.00	
3	3.2 %	28.00	16.00	5.00	
4	4.6 %	39.00	16.00	5.00	
5	6.5 %	24.00	16.00	5.00	
6	8.5 %	18.00	16.00	5.00	

Critical values are 1 tailed (k=5)

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Growth

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

ANOVA Table — No Transformation

SOURCE	DF	SS	MS	F
Between	5	0.07433	0.01487	3.323
Within (Error)	24	0.1074	0.004475	
Total	29	0.1817		

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

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	0.3554	0.3554		
2	2.2 %	0.3536	0.3536	0.04254	
3	3.2 %	0.3532	0.3532	0.052	
4	4.6 %	0.4028	0.4028	-1.12	
5	6.5 %	0.3022	0.3022	1.257	
6	8.5 %	0.245	0.245	2.609	*

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	2.2 %	5	0.09985	28.1	0.0018
3	3.2 %	5	0.09985	28.1	0.0022
4	4.6 %	5	0.09985	28.1	-0.0474
5	6.5 %	5	0.09985	28.1	0.0532
6	8.5 %	5	0.09985	28.1	0.1104

Appendix A2: Statistics

Ceriodaphnia dubia Survival

Fisher's Exact Test

Identification	Alive	Dead	Total Animals
Control	10	0	10
2.2 %	10	0	10
Total	20	0	20

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

Fisher's Exact Test

Identification	Alive	Dead	Total Animals
Control	10	0	10
3.2 %	10	0	10
Total	20	0	20

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

Fisher's Exact Test

Identification	Alive	Dead	Total Animals
Control	10	0	10
4.6 %	10	0	10
Total	20	0	20

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

Fisher's Exact Test

Identification	Alive	Dead	Total Animals
Control	10	0	10
6.5 %	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
8.5 %	9	1	10
Total	19	1	20

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

Summary of Fisher's Exact Test				
Group	Identification	Exposed	Dead	Sig 0.05
0	Control	10	0	
1	2.2 %	10	0	
2	3.2 %	10	0	
3	4.6 %	10	0	
4	6.5 %	10	1	
5	8.5 %	10	1	

Appendix A2: Statistics

Ceriodaphnia dubia Reproduction

Kolmogorov Test for Normality		No Transformation
D = 0.2007 D* = 1.575 Critical D* = 1.035	(alpha = 0.01, N = 60)	
Data FAIL normality test (alpha = 0.01).		

Steel's Many-One Rank Test					No Transformation
Ho:Control<Treatment					
Group	Identification	Rank Sum	Critical Value	DF	Sig 0.05
1	Control				
2	2.2 %	96.00	75.00	10.00	
3	3.2 %	87.00	75.00	10.00	
4	4.6 %	90.50	75.00	10.00	
5	6.5 %	84.50	75.00	10.00	
6	8.5 %	79.00	75.00	10.00	
Critical values are 1 tailed (k=5)					

Appendix A2: Statistics

Ceriodaphnia dubia Reproduction

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

ANOVA Table — No Transformation

SOURCE	DF	SS	MS	F
Between	5	71.4	14.28	0.3388
Within (Error)	52	2192	42.15	
Total	57	2263		

Critical F = 3.39 (alpha = 0.01, df = 5,52)
2.39 (alpha = 0.05, df = 5,52)

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	27.3	27.3		
2	2.2 %	26.1	26.1	0.4133	
3	3.2 %	24.3	24.3	1.033	
4	4.6 %	24.1	24.1	1.102	
5	6.5 %	25.333	25.333	0.6594	
6	8.5 %	25	25	0.771	

Dunnett's critical value = 2.31 (1 Tailed, alpha = 0.05, df [used] = 5,40) (Actual df = 5,52)
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	2.2 %	10	6.707	24.6	1.2
3	3.2 %	10	6.707	24.6	3
4	4.6 %	10	6.707	24.6	3.2
5	6.5 %	9	6.891	25.2	1.967
6	8.5 %	9	6.891	25.2	2.3

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: August 4, 2015 at 1449
Date and Time Test Terminated: August 11, 2015 at 1550

Effluent Conc.: Control		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	8.0	7.6	7.6	7.5	7.7	7.2	7.5
	Final *1	7.3	8.6	7.8	7.1	7.3	7.4	7.3
	Final *2	7.8	7.5	7.7	6.5	6.9	8.2	7.2
pH, units	Initial	7.6	7.9	8.2	8.2	7.8	8.2	8.2
	Final *1	7.7	7.6	7.6	7.8	7.5	7.5	8.0
	Final *2	8.3	7.9	7.9	7.8	7.9	8.0	8.0
Alkalinity, mg CaCO3/l		30	NA	30	NA	30	NA	NA
Hardness, mg CaCO3/l		42	NA	42	NA	42	NA	NA
Conductivity, umhos/cm		130	130	130	130	170	140	130
Res. Chlorine, mg/l		<0.05	NA	<0.05	NA	<0.05	NA	NA

Effluent Conc.: 2.2 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.6	7.6	7.7	7.8	7.2	7.3	7.6
	Final *1	7.1	8.3	7.8	7.2	6.8	7.4	7.3
	Final *2	7.9	7.5	7.4	6.8	7.2	8.0	7.0
pH, units	Initial	7.6	7.9	8.2	8.2	7.8	8.1	8.1
	Final *1	7.7	7.5	7.5	7.8	7.5	7.4	8.0
	Final *2	8.3	7.9	7.8	7.9	7.9	7.9	7.9

Effluent Conc.: 3.2 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.3	7.8	7.8	7.7	7.3	7.2	7.7
	Final *1	7.1	8.3	8.6	7.2	7.1	8.6	7.4
	Final *2	7.9	6.5	7.4	7.0	7.2	8.1	7.7
pH, units	Initial	7.6	7.9	8.2	8.2	7.7	8.1	8.1
	Final *1	7.6	7.5	7.4	7.8	7.6	7.4	7.9
	Final *2	8.3	7.6	7.8	7.9	7.9	7.9	8.3

Appendix A3: Water Chemistry

Routine Chemical and Physical Data

Date and Time Test Initiated: August 4, 2015 at 1449
Date and Time Test Terminated: August 11, 2015 at 1550

Effluent Conc.: 4.6 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.6	7.6	7.6	7.5	7.2	7.5	7.5
	Final *1	7.2	8.2	8.5	7.0	7.2	8.5	7.5
	Final *2	8.0	7.3	7.6	7.1	7.2	8.1	7.8
pH, units	Initial	7.6	7.9	8.1	8.2	7.8	8.2	8.1
	Final *1	7.7	7.5	7.5	7.8	7.6	7.5	8.0
	Final *2	8.3	7.8	7.8	7.9	7.9	7.9	8.3

Effluent Conc.: 6.5 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.7	7.6	7.4	7.5	7.5	7.5	7.7
	Final *1	7.9	8.1	8.5	7.2	7.2	8.5	7.2
	Final *2	7.7	7.4	7.7	7.4	7.1	8.1	7.7
pH, units	Initial	7.6	7.9	8.0	8.2	7.7	8.2	8.1
	Final *1	7.6	7.5	7.6	7.8	7.7	7.5	8.0
	Final *2	8.3	7.8	7.8	7.9	7.8	7.9	8.4
Alkalinity, mg CaCO3/l		32	NA	28	NA	28	NA	NA
Hardness, mg CaCO3/l		43	NA	41	NA	41	NA	NA
Conductivity, umhos/cm		130	130	130	130	170	140	130
Res. Chlorine, mg/l		<0.05	NA	<0.05	NA	<0.05	NA	NA

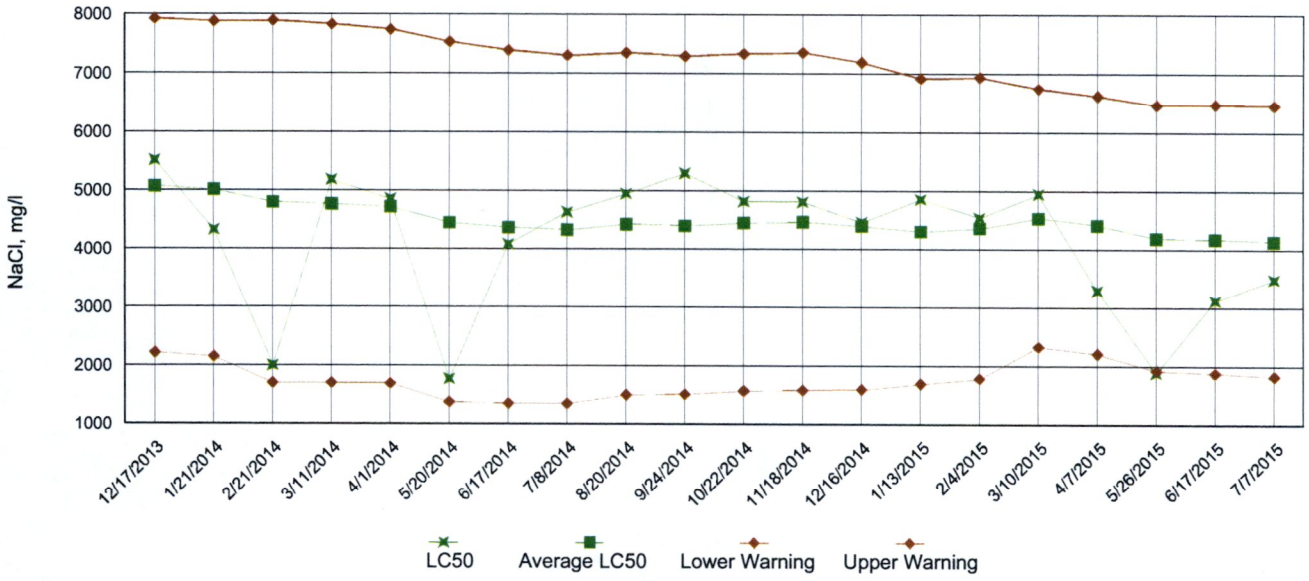
Effluent Conc.: 8.5 %		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
DO, mg/l	Initial	7.3	7.5	7.7	7.6	7.3	7.3	7.6
	Final *1	8.6	8.1	8.4	7.1	7.0	8.4	7.2
	Final *2	7.9	7.4	7.3	7.5	7.0	8.1	7.6
pH, units	Initial	7.6	7.9	8.1	8.1	7.7	8.2	8.1
	Final *1	7.6	7.5	7.5	7.8	7.7	7.5	8.0
	Final *2	8.3	7.8	7.8	7.9	7.8	8.0	8.4

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

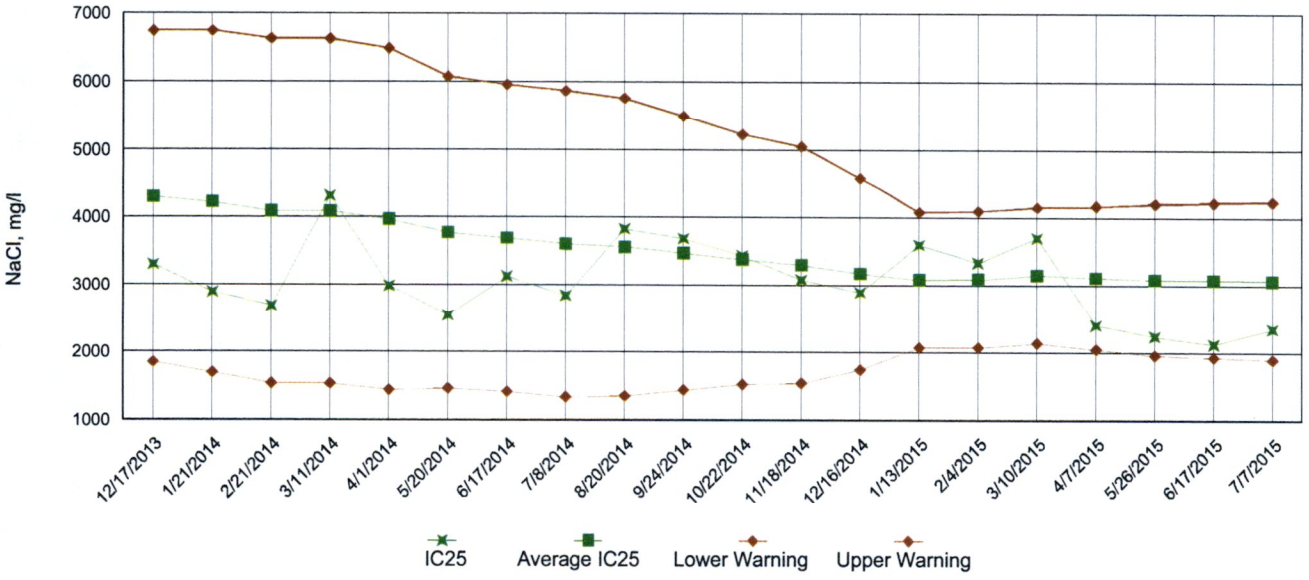
Appendix A4: Test 1000.0

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

LC50 Survival Data



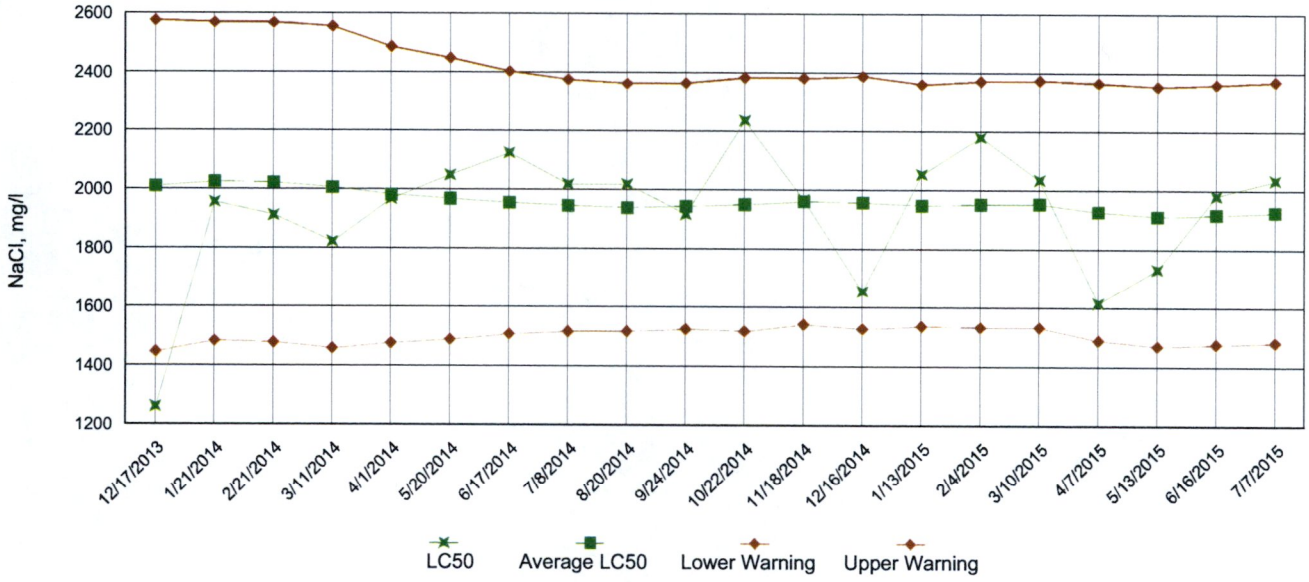
IC25 Growth Data



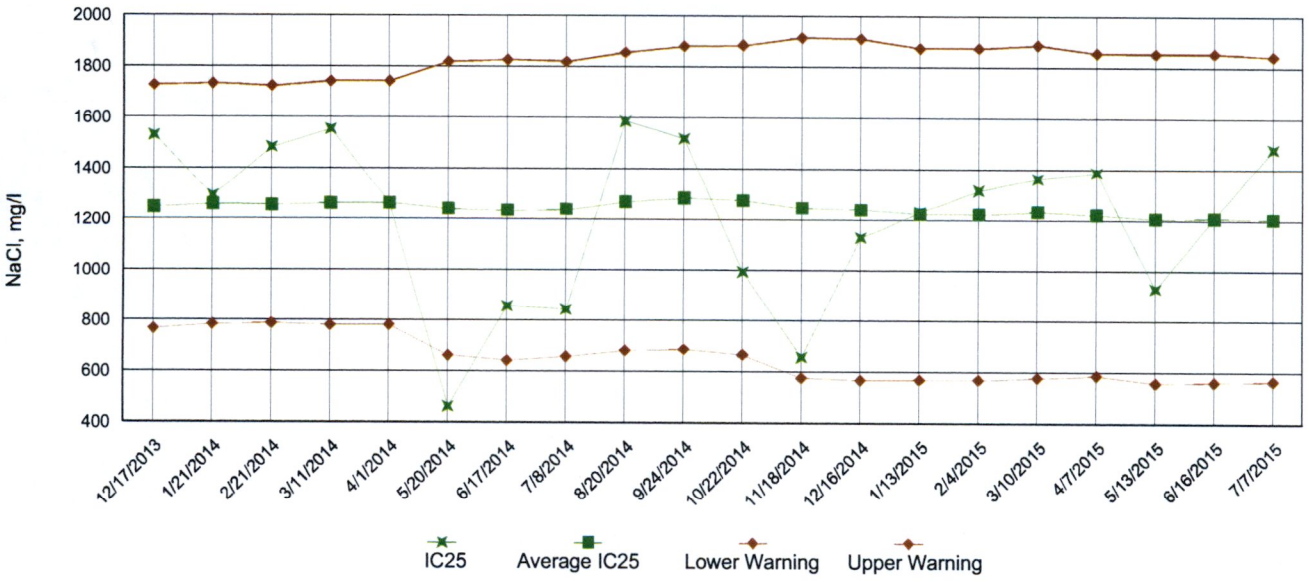
Appendix A4: Test 1002.0

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: Malvern Water Works

NPDES No.: AR0034126 AFIN 30-00040

Date and Time Test Initiated: August 4, 2015 at 1620
Date and Time Test Terminated: August 11, 2015 at 1550
Dilution water used: Synthetic Soft Water #4238

DATA TABLE FOR SURVIVAL

Effluent Conc. %	Percent Survival in replicate chambers A	B	C	D	E	Mean percent survival 24 hr	48 hr	7 days	CV%
Control	100	87.5	87.5	100	100	100	100	95.0	7.21
2.2 %	100	75.0	87.5	100	87.5	100	100	90.0	11.6
3.2 %	100	100	100	100	100	100	100	100	0.00
4.6 %	100	100	100	100	100	100	100	100	0.00
6.5 %	75.0	100	87.5	50.0	100	100	97.5	82.5	25.4
8.5 %	100	75.0	62.5	62.5	37.5	100	97.5	67.5	33.6

DATA TABLE FOR GROWTH

Effluent Conc. %	Average dry weight, mg replicate chambers A	B	C	D	E	Mean dry weight, mg	CV%
Control	0.338	0.396	0.342	0.382	0.319	0.355	9.08
2.2 %	0.340	0.230	0.410	0.374	0.414	0.354	21.3
3.2 %	0.345	0.311	0.399	0.370	0.341	0.353	9.37
4.6 %	0.400	0.392	0.398	0.418	0.406	0.403	2.45
6.5 %	0.278	0.416	0.354	0.132	0.331	0.302	35.5
8.5 %	0.355	0.312	0.204	0.210	0.144	0.245	35.2

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	(6.5 %)	____YES	X NO
b.) 1/2 LOW FLOW DILUTION	(NA)	____YES	____NO

2. Steel's Many-One Rank 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	(6.5 %)	____YES	X NO
b.) 1/2 LOW FLOW DILUTION	(NA)	____YES	____NO

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

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

5. NOEC Pimephales Lethality: 8.5 % (TOP6C)

6. LOEC Pimephales Lethality: 8.5 % (TXP6C)

7. NOEC Pimephales Sublethality: 8.5 % (TPP6C)

8. LOEC Pimephales Sublethality: 8.5 % (TYP6C)

9. Coefficient of variation for Pimephales growth: 35.5 (TQP6C)

Appendix B: Test 1000.0

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

PERMITTEE: Malvern Water Works
NPDES NO.: AR0034126 AFIN 30-00040
CONTACT: Mr. John Davis
ANALYST: 280, 304, 310, 314

Test Initiated: DATE: August 4, 2015 TIME: 1620
Test Terminated: DATE: August 11, 2015 TIME: 1550

DILUTION Control	DAY 1	2	3	4	5	6	7
D.O. Initial	8.0	7.6	7.6	7.5	7.7	7.2	7.5
Final	7.3	8.6	7.8	7.1	7.3	7.4	7.3
pH Initial	7.6	7.9	8.2	8.2	7.8	8.2	8.2
Final	7.7	7.6	7.6	7.8	7.5	7.5	8.0
Alkalinity	30	NA	30	NA	30	NA	NA
Hardness	42	NA	42	NA	42	NA	NA
Conductivity	130	130	130	130	170	140	130
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 2.2 %	DAY 1	2	3	4	5	6	7
D.O. Initial	7.6	7.6	7.7	7.8	7.2	7.3	7.6
Final	7.1	8.3	7.8	7.2	6.8	7.4	7.3
pH Initial	7.6	7.9	8.2	8.2	7.8	8.1	8.1
Final	7.7	7.5	7.5	7.8	7.5	7.4	8.0
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	130	130	130	130	170	140	130
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 3.2 %	DAY 1	2	3	4	5	6	7
D.O. Initial	7.3	7.8	7.8	7.7	7.3	7.2	7.7
Final	7.1	8.3	8.6	7.2	7.1	8.6	7.4
pH Initial	7.6	7.9	8.2	8.2	7.7	8.1	8.1
Final	7.6	7.5	7.4	7.8	7.6	7.4	7.9
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	130	130	130	130	170	140	130
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 4.6 %	DAY 1	2	3	4	5	6	7
D.O. Initial	7.6	7.6	7.6	7.5	7.2	7.5	7.5
Final	7.2	8.2	8.5	7.0	7.2	8.5	7.5
pH Initial	7.6	7.9	8.1	8.2	7.8	8.2	8.1
Final	7.7	7.5	7.5	7.8	7.6	7.5	8.0
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	130	130	130	130	170	140	130
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 6.5 %	DAY 1	2	3	4	5	6	7
D.O. Initial	7.7	7.6	7.4	7.5	7.5	7.5	7.7
Final	7.9	8.1	8.5	7.2	7.2	8.5	7.2
pH Initial	7.6	7.9	8.0	8.2	7.7	8.2	8.1
Final	7.6	7.5	7.6	7.8	7.7	7.5	8.0
Alkalinity	32	NA	28	NA	28	NA	NA
Hardness	43	NA	41	NA	41	NA	NA
Conductivity	130	130	130	130	170	140	130
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 8.5 %	DAY 1	2	3	4	5	6	7
D.O. Initial	7.3	7.5	7.7	7.6	7.3	7.3	7.6
Final	8.6	8.1	8.4	7.1	7.0	8.4	7.2
pH Initial	7.6	7.9	8.1	8.1	7.7	8.2	8.1
Final	7.6	7.5	7.5	7.8	7.7	7.5	8.0
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	130	130	130	130	180	140	130
Chlorine	NA	NA	NA	NA	NA	NA	NA

Appendix B: Test 1002.0

SUMMARY REPORTING FORMS
CHRONIC BIOMONITORING
Ceriodaphnia dubia
SURVIVAL AND REPRODUCTION

Permittee: Malvern Water Works

NPDES No.: AR0034126 AFIN 30-00040

Date and Time Test Initiated: August 4, 2015 at 1545
Date and Time Test Terminated: August 11, 2015 at 1450
Dilution water used: Synthetic Soft Water #4238

PERCENT SURVIVAL

		Percent Effluent				
Time of Reading	Control	2.2 %	3.2 %	4.6 %	6.5 %	8.5 %
24 hour	100	100	100	100	100	100
48 hour	100	100	100	100	100	100
7 day	100	100	100	100	90.0	90.0

NUMBER OF YOUNG PRODUCED PER FEMALE @ 7 DAYS

		Percent Effluent				
Replicates	Control	2.2 %	3.2 %	4.6 %	6.5 %	8.5 %
A	24	28	29	21	13	21
B	29	30	28	1	26	24
C	28	24	24	26	26	19
D	15	28	20	31	24	27
E	33	35	27	29	28	25
F	28	32	25	27	0	0
G	29	20	26	23	29	31
H	31	24	27	24	23	26
I	27	17	35	28	31	28
J	29	23	2	31	28	24
Mean per Adult	27.3	26.1	24.3	24.1	22.8	22.5
Mean per Surviving Adult	27.3	26.1	24.3	24.1	25.3	25.0
CV %	18.0	21.2	35.9	36.4	20.7	14.4

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 (6.5 %) ____YES __X__ NO
   b.) 1/2 LOW FLOW DILUTION (NA) ____YES ____ NO

2. Steel's Many-One Rank Test:

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

   a.) LOW FLOW OR CRITICAL DILUTION (6.5 %) ____YES __X__ NO
   b.) 1/2 LOW FLOW DILUTION (NA) ____YES ____ NO

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

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

5. NOEC Ceriodaphnia Lethality: 8.5 % (TOP3B)

6. LOEC Ceriodaphnia Lethality: 8.5 % (TXP3B)

7. NOEC Ceriodaphnia Sublethality: 8.5 % (TPP3B)

8. LOEC Ceriodaphnia Sublethality: 8.5 % (TYP3B)

9. Coefficient of variation for Ceriodaphnia Reproduction: 20.7 (TQP3B)

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Appendix B: Test 1002.0

CHRONIC TOXICITY SUMMARY FORM
Ceriodaphnia dubia
CHEMICAL PARAMETERS CHART

PERMITTEE: Malvern Water Works
NPDES NO.: AR0034126 AFIN 30-00040
CONTACT: Mr. John Davis
ANALYST: 280, 304, 310, 314

Test Initiated: DATE: August 4, 2015 TIME: 1545
Test Terminated: DATE: August 11, 2015 TIME: 1450

DILUTION Control	DAY 1	2	3	4	5	6	7
D.O. Initial	8.0	7.6	7.6	7.5	7.7	7.2	7.5
Final	7.8	7.5	7.7	6.5	6.9	8.2	7.2
pH Initial	7.6	7.9	8.2	8.2	7.8	8.2	8.2
Final	8.3	7.9	7.9	7.8	7.9	8.0	8.0
Alkalinity	30	NA	30	NA	30	NA	NA
Hardness	42	NA	42	NA	42	NA	NA
Conductivity	130	130	130	130	170	140	130
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 2.2 %	DAY 1	2	3	4	5	6	7
D.O. Initial	7.6	7.6	7.7	7.8	7.2	7.3	7.6
Final	7.9	7.5	7.4	6.8	7.2	8.0	7.0
pH Initial	7.6	7.9	8.2	8.2	7.8	8.1	8.1
Final	8.3	7.9	7.8	7.9	7.9	7.9	7.9
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	130	130	130	130	170	140	130
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 3.2 %	DAY 1	2	3	4	5	6	7
D.O. Initial	7.3	7.8	7.8	7.7	7.3	7.2	7.7
Final	7.9	6.5	7.4	7.0	7.2	8.1	7.7
pH Initial	7.6	7.9	8.2	8.2	7.7	8.1	8.1
Final	8.3	7.6	7.8	7.9	7.9	7.9	8.3
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	130	130	130	130	170	140	130
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 4.6 %	DAY 1	2	3	4	5	6	7
D.O. Initial	7.6	7.6	7.6	7.5	7.2	7.5	7.5
Final	8.0	7.3	7.6	7.1	7.2	8.1	7.8
pH Initial	7.6	7.9	8.1	8.2	7.8	8.2	8.1
Final	8.3	7.8	7.8	7.9	7.9	7.9	8.3
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	130	130	130	130	170	140	130
Chlorine	NA	NA	NA	NA	NA	NA	NA

DILUTION 6.5 %	DAY 1	2	3	4	5	6	7
D.O. Initial	7.7	7.6	7.4	7.5	7.5	7.5	7.7
Final	7.7	7.4	7.7	7.4	7.1	8.1	7.7
pH Initial	7.6	7.9	8.0	8.2	7.7	8.2	8.1
Final	8.3	7.8	7.8	7.9	7.8	7.9	8.4
Alkalinity	32	NA	28	NA	28	NA	NA
Hardness	43	NA	41	NA	41	NA	NA
Conductivity	130	130	130	130	170	140	130
Chlorine	<0.05	NA	<0.05	NA	<0.05	NA	NA

DILUTION 8.5 %	DAY 1	2	3	4	5	6	7
D.O. Initial	7.3	7.5	7.7	7.6	7.3	7.3	7.6
Final	7.9	7.4	7.3	7.5	7.0	8.1	7.6
pH Initial	7.6	7.9	8.1	8.1	7.7	8.2	8.1
Final	8.3	7.8	7.8	7.9	7.8	8.0	8.4
Alkalinity	NA	NA	NA	NA	NA	NA	NA
Hardness	NA	NA	NA	NA	NA	NA	NA
Conductivity	130	130	130	130	180	140	130
Chlorine	NA	NA	NA	NA	NA	NA	NA

AMERICAN INTERPLEX CORPORATION
LABORATORIES

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

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

PAGE OF

Client: MAUREEN WASTEWATER
Project Reference:
Project Manager:
Sampled By: JOHN DAVIS

PO No.

SAMPLE MATRIX: WATER, SOIL

NO OF BOTTLES

ANALYSES REQUESTED: Chloride, Cd + Fl

AIC CONTROL NO: 192931
AIC PROPOSAL NO:
Carrier:
Received on Ice (4°C)? YES 2.1 °C NO

AIC No.	Sample Identification	Date/Time Collected	GRAB	COMP	WATER	SOIL	NO OF BOTTLES	Chloride, Cd + Fl	Remarks
1	MAUREEN WASTEWATER	8/4/15 9:15AM		X			1	X	
		Container Type							
		Preservative							

Field pH calibration on _____ @ _____
Buffer:

G = Glass P = Plastic V = VOA vials H = HCl to pH2 T = Sodium Thiosulfate
NO = none S = Sulfuric acid pH2 N = Nitric acid pH2 B = NaOH to pH12 Z = Zinc acetate

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

Relinquished By:	Date/Time	Received By:	Date/Time
	8/4/15 12:28PM		
Relinquished By:	Date/Time	Received in Lab By:	Date/Time
			8.4-15 1228

Comments:

5/01

FORM 0060

AMERICAN INTERPLEX CORPORATION
LABORATORIES

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

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

PAGE OF

Client: MALVERN WASTEWATER
Project Reference:
Project Manager:
Sampled By: JOHN DAVIS

PO No.

SAMPLE MATRIX

NO OF BOTTLES

ANALYSES REQUESTED

AIC CONTROL NO: 92931
AIC PROPOSAL NO:
Carrier:
Received on Ice (4°C)? (YES) 0.2 NO

AIC No.	Sample Identification	Date/Time Collected	GRAB	COMP	WATER	SOIL		NO OF BOTTLES	Chlorox CD+FH	Remarks
2	MALVERN WASTEWATER 2	8/5/15 9:32A		X				1	X	
		Container Type								
		Preservative								

Field pH calibration
on _____ @ _____
Buffer:

G = Glass P = Plastic V = VOA vials H = HCl to pH2 T = Sodium Thiosulfate
NO = none S = Sulfuric acid pH2 N = Nitric acid pH2 B = NaOH to pH12 Z = Zinc acetate

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

Relinquished By:	Date/Time	Received By:	Date/Time
	8/5/15 12:57 PM		
Relinquished By:	Date/Time	Received in Lab By:	Date/Time
		[signature]	8-5-15 1253

Comments:

5/01

FORM 0060

AMERICAN INTERPLEX CORPORATION
LABORATORIES

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

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

PAGE OF

Client: MALVERN WASTEWATER
Project Reference:
Project Manager:
Sampled By: JOHN DAVIS

PO No.

SAMPLE MATRIX: GRAB | COMP | WATER | SOIL

NO OF BOTTLES

ANALYSES REQUESTED: Chloride CO+GH

AIC CONTROL NO: 192931
AIC PROPOSAL NO:
Carrier:
Received on Ice (4°C)? YES NO
Remarks 2.6°C

AIC No.	Sample Identification	Date/Time Collected	GRAB	COMP	WATER	SOIL	NO OF BOTTLES	Chloride CO+GH
3	MALVERN WASTEWATER 3	8/7/15 9:15AM		X			1	X
		Container Type						
		Preservative						

Field pH calibration on _____ @ _____
Buffer:

G = Glass P = Plastic V = VOA vials H = HCl to pH2 T = Sodium Thiosulfate
NO = none S = Sulfuric acid pH2 N = Nitric acid pH2 B = NaOH to pH12 Z = Zinc acetate

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

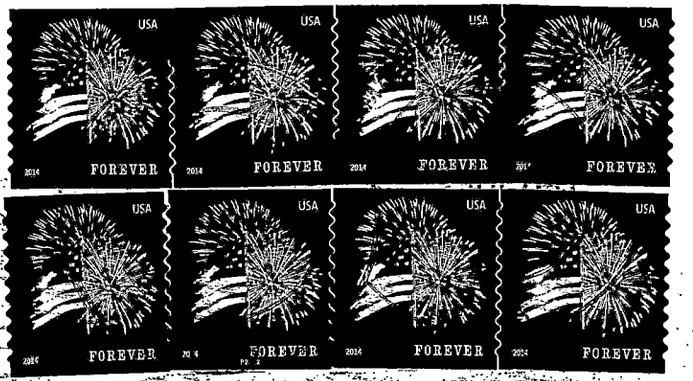
Relinquished By:	Date/Time	Received By:	Date/Time
[signature]	8/7/15 11:05 AM		
Relinquished By:	Date/Time	Received in Lab By: DANNY	Date/Time 8-7-15 11:05

Comments:

5/01

FORM 0080

Malver
Wastewater Division
P.O.Box 638
Malvern, AR 72104



ADEQ
WATER DIVISION-ENFORCEMENT BRANCH
5301 NORTHSHORE DRIVE
NORTH LITTLE ROCK, AR 72118-5317