April 30, 2020

Biomonitoring Testing
for
East Plant

Control No. 244575-1

Prepared for:

Ms. Whitney Young
City Water & Light of Jonesboro
5205 Ingels Road
Jonesboro, AR 72401

Prepared by:

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

City Water & Light of Jonesboro
ATTN: Ms. Whitney Young
5205 Ingels Road
Jonesboro, AR 72401

Re: *Pimephales promelas* (Fathead minnow) and *Ceriodaphnia dubia*
East Plant
NPDES Permit No. AR0043401 AFIN16-00936

Dear Ms. Whitney Young:

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 Chief Operating Officer 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 <32 % effluent, which is below the critical dilution of 100 %. The NOEC for reproduction occurred at <32 % effluent, which is below the sub-lethal limit of 80 %. **The sample, therefore, FAILED both lethal and sub-lethal effects for the *Ceriodaphnia dubia* test.**

AMERICAN INTERPLEX CORPORATION

John Overbey
Chief Operating Officer

PDF cc: City Water & Light of Jonesboro
ATTN: Mr. Adam Saulsbury
asaulsbury@jonesborocwl.org

City Water & Light of Jonesboro
ATTN: Mr. Jody Gibson
jgibson@jonesborocwl.org

City Water & Light of Jonesboro
ATTN: Mr. Jay Earley
jearley@jonesborocwl.org

City Water & Light of Jonesboro
ATTN: Ms. Whitney Young
wyoung@jonesborocwl.org

City Water & Light of Jonesboro
ATTN: Ms. Tamara Blankenship
tblankenship@jonesborocwl.org

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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	0.538	PASS
Control Growth CV < or = 40%	10.3	PASS
Growth Minimum Significant Difference 12 to 30%	16.7	PASS
Critical Dilution CV < or = 40%	9.43	PASS

Ceriodaphnia dubia Method 1002.0

CRITERIA	RESULTS	PASS/FAIL
Control Survival > or = 80%	80.0	PASS
Control Reproduction > or = 15 per Surviving Female	26.6	PASS
Control CV < or = 40% per Surviving Female	10.4	PASS
Reproduction Minimum Significant Difference 13 to 47%	NA	NA
Critical Dilution CV < or = 40%	0.00	PASS

II. Outlined Report

A. Introduction

1. Permit Number: AR0043401 AFIN16-00936
2. Test Requirements:
   Test Methods 1000.0 and 1002.0

B. Source of Effluent/Dilution Water:

1. Effluent Samples:
   a. Sampling Point: East Plant
   b. Chemical Data:

Analysis	Sample 1	Sample 2	Sample 3
Dissolved oxygen (mg/l)	8.3	7.5	6.4
pH (standard units)	7.6	7.9	8.0
Alkalinity (mg/l as CaCO3)	130	120	100
Hardness (mg/l as CaCO3)	120	180	100
Conductivity (umhos/cm)	660	710	600
Residual Chlorine (mg/l)	<0.05	<0.05	<0.05
Ammonia as N (mg/l)	0.20	0.12	0.18

2. Dilution Water Samples:
   Moderately Hard

Analysis	244541-1
Dissolved oxygen (mg/l)	0.0
pH (standard units)	7.9
Alkalinity (mg/l as CaCO3)	60
Hardness (mg/l as CaCO3)	88
Conductivity (umhos/cm)	310
Residual Chlorine (mg/l)	<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:	April 21, 2020 at 0920
Date & Time Test Terminated:	April 28, 2020 at 0920
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 Reproduction Method 1002.0

Date & Time Test Initiated:	April 21, 2020 at 1000
Date & Time Test Terminated:	April 27, 2020 at 0955
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. Source 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 and following EPA method criteria.

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 not analyzed due to survival failure.

IV. Standard Reference Toxicants

The sensitivity of the offspring is determined by performing a standard reference toxicant test monthly. Sodium chloride in synthetic moderately hard water is used as prescribed in EPA-821-R-02-013.

Pimephales promelas (Fathead minnow)

A chronic reference test was performed on April 01, 2020 at 0920 to April 08, 2020 at 0920
The results were as follows: (Control No. 243967-1.)

Survival LC-50: 4385 mg/l
Growth IC-25: 2514 mg/l
Growth PMSD: 0

Ceriodaphnia dubia

A chronic reference test was performed on April 01, 2020 at 1110 to April 07, 2020 at 1118
The results were as follows: (Control No. 243967-2.)

Survival LC-50: 1673.1 mg/l
Reproduction IC-25: 1072 mg/l
Reproduction PMSD: 14.2

V. Organism History

Pimephales promelas (Fathead minnow)

Date: April 21, 2020
Age: <24 hours
Source: In-house culture
Water: Moderately hard synthetic
Temperature: 25 deg.C

Ceriodaphnia dubia

Date: April 21, 2020
Age: <24 hours
Source: In-house culture
Water: Moderately hard synthetic
Temperature: 25 deg.C

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

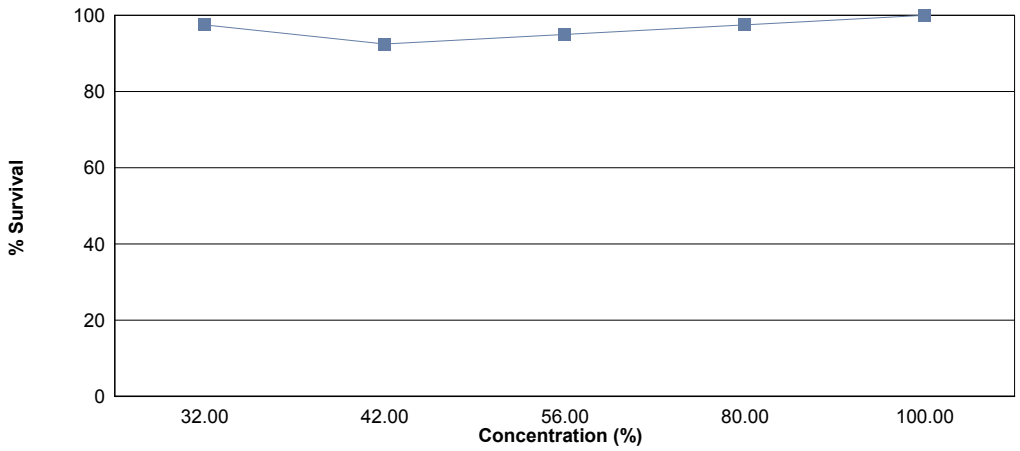
Larvae are exposed in a static renewal system for seven days to different concentrations of effluent with dilution water. Test results are based on the survival and growth (weight) of the larvae.

Effluent dilutions for this test were 32 %, 42 %, 56 %, 80 %, 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 April 21, 2020 at 0920 and continued through April 28, 2020 at 0920. 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	0.525
32 %	97.5	0.540
42 %	92.5	0.500
56 %	95.0	0.531
80 %	97.5	0.519
100 %	100	0.550

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 or a maximum of eight test days.

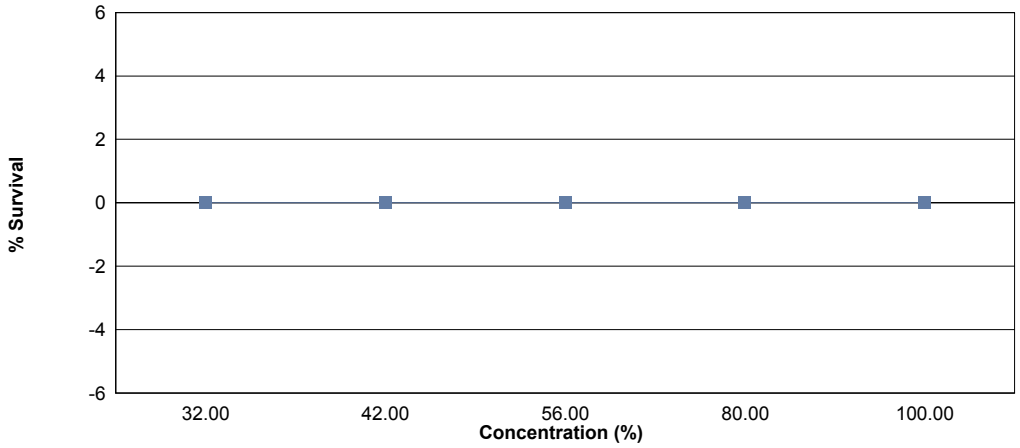
Effluent dilutions for this test were 32 %, 42 %, 56 %, 80 %, 100 % in accordance with the NPDES permit.

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

The test was initiated on April 21, 2020 at 1000 and continued through April 27, 2020 at 0955. Statistical analyses were performed on the observed data and the no observable effects concentrations (NOECs) were as follows:

a.) NOEC survival = <32 % effluent
b.) NOEC reproduction = <32 % effluent

(NOEC for sublethal effects was determined by Lower PMSD Bound Test.)



Summary of the 6-day *Ceriodaphnia dubia* Survival and Reproduction Data		
Concentration	Percent Survival	Mean Reproduction
Control	80.0	23.0
32 %	0.00 *	--
42 %	0.00 *	--
56 %	0.00 *	--
80 %	0.00 *	--
100 %	0.00 *	--

*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: April 21, 2020 at 0920
Date and Time Test Terminated: April 28, 2020 at 0920

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	7	7	7	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	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	6	6	6
	B	8	8	8	8	8	8	8
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	7	7
	E	8	8	8	8	8	8	8
56 %	A	8	8	8	8	8	8	8
	B	8	8	8	8	8	7	7
	C	8	8	8	8	8	8	8
	D	8	8	8	8	8	8	8
	E	8	7	7	7	7	7	7
80 %	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	7
	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: April 21, 2020 at 0920
Test Terminated: April 28, 2020 at 0920

Concentration	Replicate	Weight of pan	Weight of pan + fish	Total weight of fish (g)	Original # of fish	Mean dry weight (mg)
Control	A	.92937	.93391	0.00454	8	0.568
	B	.92801	.93238	0.00437	8	0.546
	C	.92733	.93160	0.00427	8	0.534
	D	.92490	.92835	0.00345	8	0.431
	E	.92498	.92934	0.00436	8	0.545
32 %	A	.92809	.93200	0.00391	8	0.489
	B	.92521	.92910	0.00389	8	0.486
	C	.93094	.93540	0.00446	8	0.558
	D	.92762	.93236	0.00474	8	0.592
	E	.92741	.93200	0.00459	8	0.574
42 %	A	.92717	.93029	0.00312	8	0.390
	B	.92490	.92896	0.00406	8	0.508
	C	.92208	.92677	0.00469	8	0.586
	D	.92204	.92616	0.00412	8	0.515
	E	.92538	.92939	0.00401	8	0.501
56 %	A	.92418	.92859	0.00441	8	0.551
	B	.92514	.92874	0.00360	8	0.450
	C	.92703	.93169	0.00466	8	0.582
	D	.93011	.93485	0.00474	8	0.592
	E	.92634	.93020	0.00386	8	0.482
80 %	A	.92173	.92591	0.00418	8	0.522
	B	.92020	.92470	0.00450	8	0.562
	C	.92026	.92484	0.00458	8	0.572
	D	.92182	.92515	0.00333	8	0.416
	E	.92305	.92723	0.00418	8	0.522
100 %	A	.92485	.92875	0.00390	8	0.488
	B	.92477	.92978	0.00501	8	0.626
	C	.92550	.92982	0.00432	8	0.540
	D	.92091	.92547	0.00456	8	0.570
	E	.92128	.92548	0.00420	8	0.525

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: April 21, 2020 at 1000
Date and Time Test Terminated: April 27, 2020 at 0955

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	4	5	5	5	4	X	4	4	6	4	41	9	4.56
4	0	0	0	0	0	X	0	0	0	7	7	9	0.778
5	10	11	9	9	8	X	10	8	10	0	75	9	8.33
6	12	13	13	3X	13	X	11	11	16	15	107	8	13.4
7													
8													
TOTAL	26	29	27	17	25	0	25	23	32	26	230	10	23.0

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	X	0	0	0	0	0	0	0	9	0.00
2	0	0	0	X	X	X	X	X	X	X	0	3	0.00
3	X	X	0	X	X	X	X	X	X	X	0	1	0.00
4	X	X	X	X	X	X	X	X	X	X	0	0	0.00
5	X	X	X	X	X	X	X	X	X	X	0	0	0.00
6	X	X	X	X	X	X	X	X	X	X	0	0	0.00
7													
8													
TOTAL	0	0	0	0	0	0	0	0	0	0	0	10	0.00

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	X	0	9	0.00
2	0	0	0	0	0	0	0	0	X	X	0	8	0.00
3	X	0	0	X	1X	0	X	X	X	X	1	3	0.333
4	X	X	X	X	X	X	X	X	X	X	0	0	0.00
5	X	X	X	X	X	X	X	X	X	X	0	0	0.00
6	X	X	X	X	X	X	X	X	X	X	0	0	0.00
7													
8													
TOTAL	0	0	0	0	1	0	0	0	0	0	1	10	0.100

Appendix A1: Test 1002.0

Ceriodaphnia dubia Survival and Reproduction

Date and Time Test Initiated: April 21, 2020 at 1000
Date and Time Test Terminated: April 27, 2020 at 0955

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	X	0	0	0	0	0	0	0	X	0	8	0.00
2	0	X	0	0	0	0	0	0	0	X	0	8	0.00
3	X	X	0	X	X	0	X	X	X	X	0	2	0.00
4	X	X	X	X	X	X	X	X	X	X	0	0	0.00
5	X	X	X	X	X	X	X	X	X	X	0	0	0.00
6	X	X	X	X	X	X	X	X	X	X	0	0	0.00
7													
8													
TOTAL	0	0	0	0	0	0	0	0	0	0	0	10	0.00

Concentration: 80 %													
Day	Replicate										No. of Young	No. of Adults	Young per Adult
	1	2	3	4	5	6	7	8	9	10			
1	X	X	0	0	0	0	0	X	0	0	0	7	0.00
2	X	X	0	0	0	0	0	X	0	0	0	7	0.00
3	X	X	0	0	0	0	0	X	0	X	0	6	0.00
4	X	X	X	X	X	X	X	X	X	X	0	0	0.00
5	X	X	X	X	X	X	X	X	X	X	0	0	0.00
6	X	X	X	X	X	X	X	X	X	X	0	0	0.00
7													
8													
TOTAL	0	0	0	0	0	0	0	0	0	0	0	10	0.00

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	X	0	0	0	0	0	0	0	0	0	9	0.00
2	0	X	0	0	0	0	X	0	X	0	0	7	0.00
3	X	X	0	0	X	X	X	X	X	X	0	2	0.00
4	X	X	X	X	X	X	X	X	X	X	0	0	0.00
5	X	X	X	X	X	X	X	X	X	X	0	0	0.00
6	X	X	X	X	X	X	X	X	X	X	0	0	0.00
7													
8													
TOTAL	0	0	0	0	0	0	0	0	0	0	0	10	0.00

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	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	0.75000	1.04720
3	42 %	2	1.00000	1.39310
3	42 %	3	1.00000	1.39310
3	42 %	4	0.87500	1.20940
3	42 %	5	1.00000	1.39310
4	56 %	1	1.00000	1.39310
4	56 %	2	0.87500	1.20940
4	56 %	3	1.00000	1.39310
4	56 %	4	1.00000	1.39310
4	56 %	5	0.87500	1.20940
5	80 %	1	1.00000	1.39310
5	80 %	2	1.00000	1.39310
5	80 %	3	1.00000	1.39310
5	80 %	4	0.87500	1.20940
5	80 %	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 = 0.2188		
W = 0.8385		
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	42 %	24.50	16.00	5.00	
4	56 %	25.00	16.00	5.00	
5	80 %	27.50	16.00	5.00	
6	100 %	30.00	16.00	5.00	

Critical values are 1 tailed (k=5)

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Growth

Shapiro - Wilk's Test for Normality		No Transformation
D = 0.08281		
W = 0.935		
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 = 0.6775		
Critical B = 15.086	(alpha = 0.01, df = 5)	
Data PASS B1 homogeneity test at 0.01 level.		

Appendix A2: Statistics

Pimephales promelas (Fathead minnow) Growth

ANOVA Table				No Transformation
SOURCE	DF	SS	MS	F
Between	5	0.007515	0.001503	0.4357
Within (Error)	24	0.08281	0.00345	
Total	29	0.09032		

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	0.5248	0.5248		
2	32 %	0.5398	0.5398	-0.4038	
3	42 %	0.5	0.5	0.6676	
4	56 %	0.5314	0.5314	-0.1777	
5	80 %	0.5188	0.5188	0.1615	
6	100 %	0.5498	0.5498	-0.673	

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	0.08767	16.7	-0.015
3	42 %	5	0.08767	16.7	0.0248
4	56 %	5	0.08767	16.7	-0.0066
5	80 %	5	0.08767	16.7	0.006
6	100 %	5	0.08767	16.7	-0.025

Appendix A2: Statistics

Ceriodaphnia dubia Survival

Fisher's Exact Test

Identification	Alive	Dead	Total Animals
Control	8	2	10
32 %	0	10	10
Total	8	12	20

Critical Fisher's value (10,10,8) (alpha=0.05) is 3. b value is 0. Since b is less than or equal to 3 there is A SIGNIFICANT DIFFERENCE between CONTROL and TREATMENT at the 0.05 level.

Fisher's Exact Test

Identification	Alive	Dead	Total Animals
Control	8	2	10
42 %	0	10	10
Total	8	12	20

Critical Fisher's value (10,10,8) (alpha=0.05) is 3. b value is 0. Since b is less than or equal to 3 there is A SIGNIFICANT DIFFERENCE between CONTROL and TREATMENT at the 0.05 level.

Fisher's Exact Test

Identification	Alive	Dead	Total Animals
Control	8	2	10
56 %	0	10	10
Total	8	12	20

Critical Fisher's value (10,10,8) (alpha=0.05) is 3. b value is 0. Since b is less than or equal to 3 there is A SIGNIFICANT DIFFERENCE between CONTROL and TREATMENT at the 0.05 level.

Fisher's Exact Test

Identification	Alive	Dead	Total Animals
Control	8	2	10
80 %	0	10	10
Total	8	12	20

Critical Fisher's value (10,10,8) (alpha=0.05) is 3. b value is 0. Since b is less than or equal to 3 there is A 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	8	2	10
100 %	0	10	10
Total	8	12	20

Critical Fisher's value (10,10,8) (alpha=0.05) is 3. b value is 0. Since b is less than or equal to 3 there is A 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	2	
1	32 %	10	10	*
2	42 %	10	10	*
3	56 %	10	10	*
4	80 %	10	10	*
5	100 %	10	10	*

Lower PMSD Bound Test for Ceriodaphnia dubia

Concentration	Reproduction	Relative Difference from Control	Pass/Fail
Control	23.0	-	
32 %	0.00	100	FAIL
42 %	0.100	99.6	FAIL
56 %	0.00	100	FAIL
80 %	0.00	100	FAIL
100 %	0.00	100	FAIL

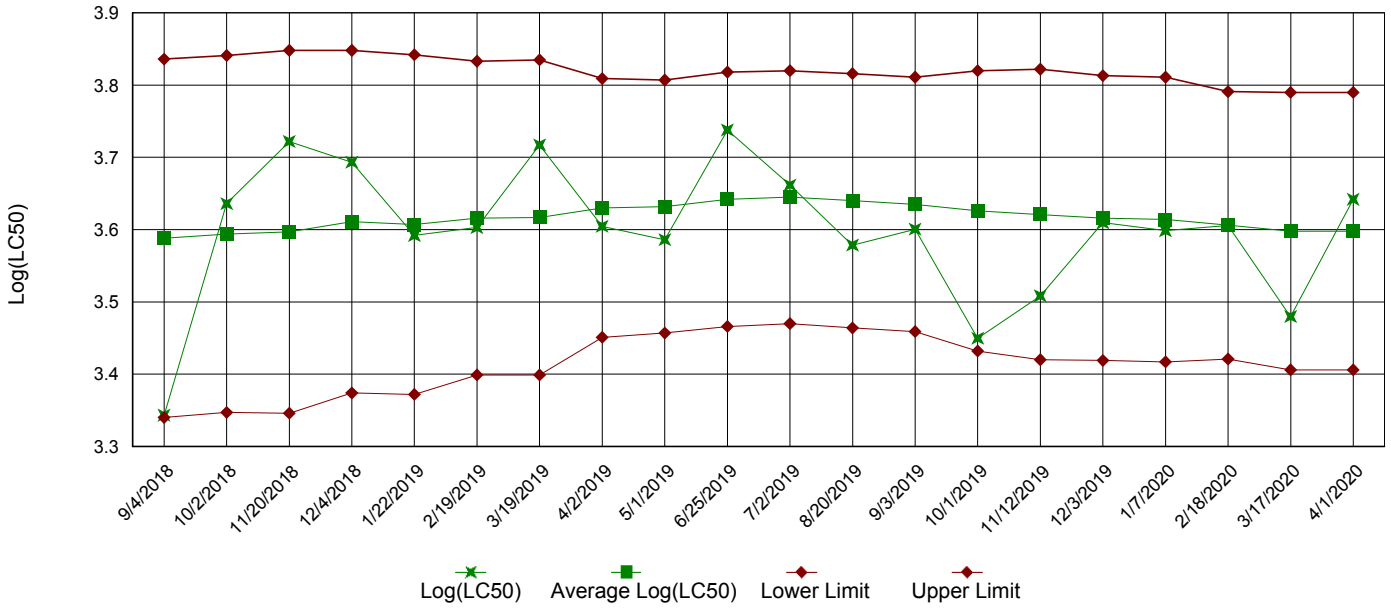
Limit = 13

NOEC = <32 %
LOEC = 32 %

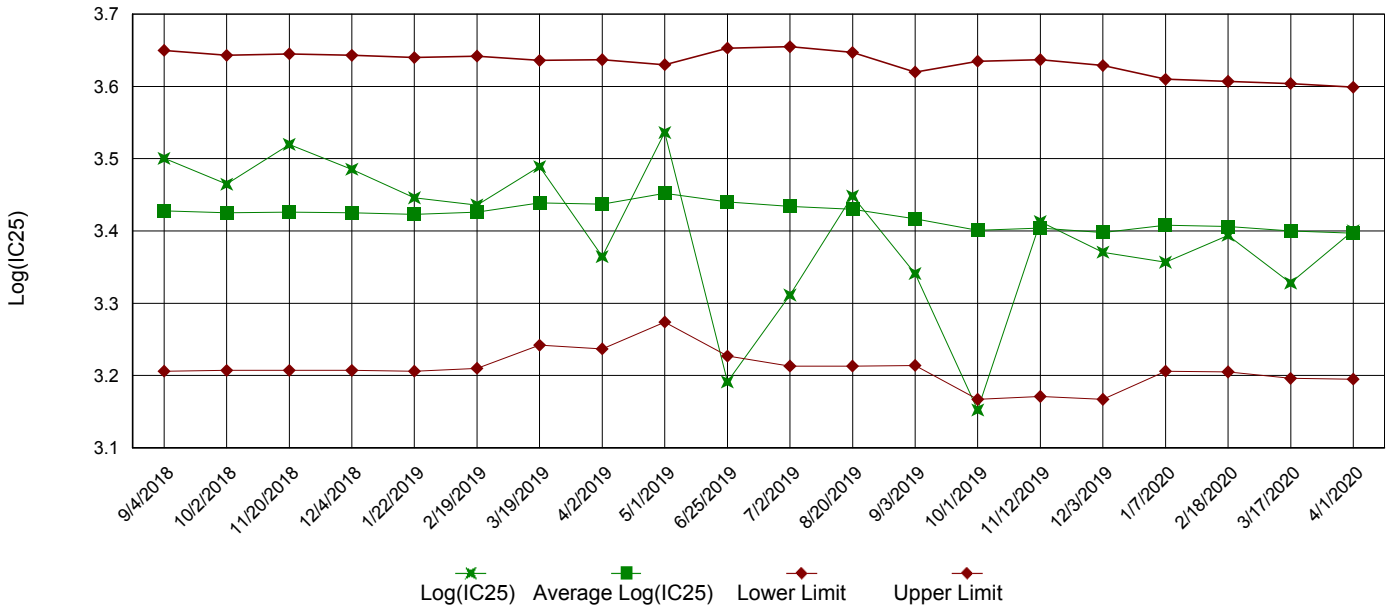
Appendix A3: Test 1000.0

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

LC50 Survival Data



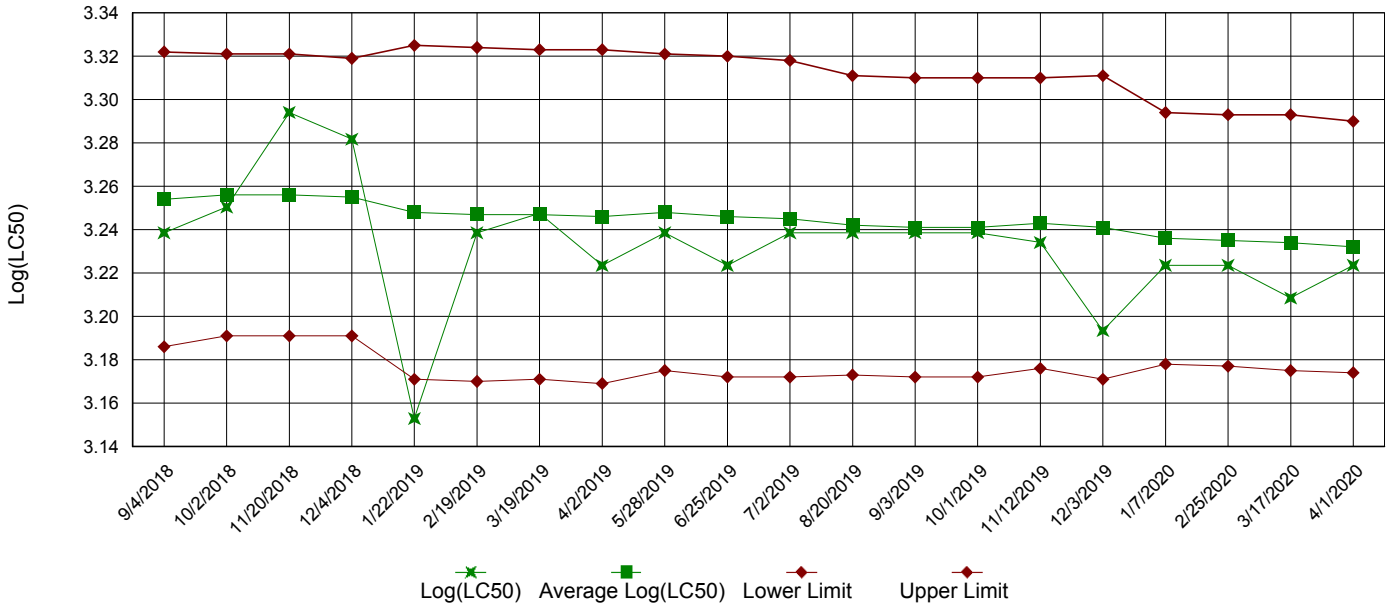
IC25 Growth Data



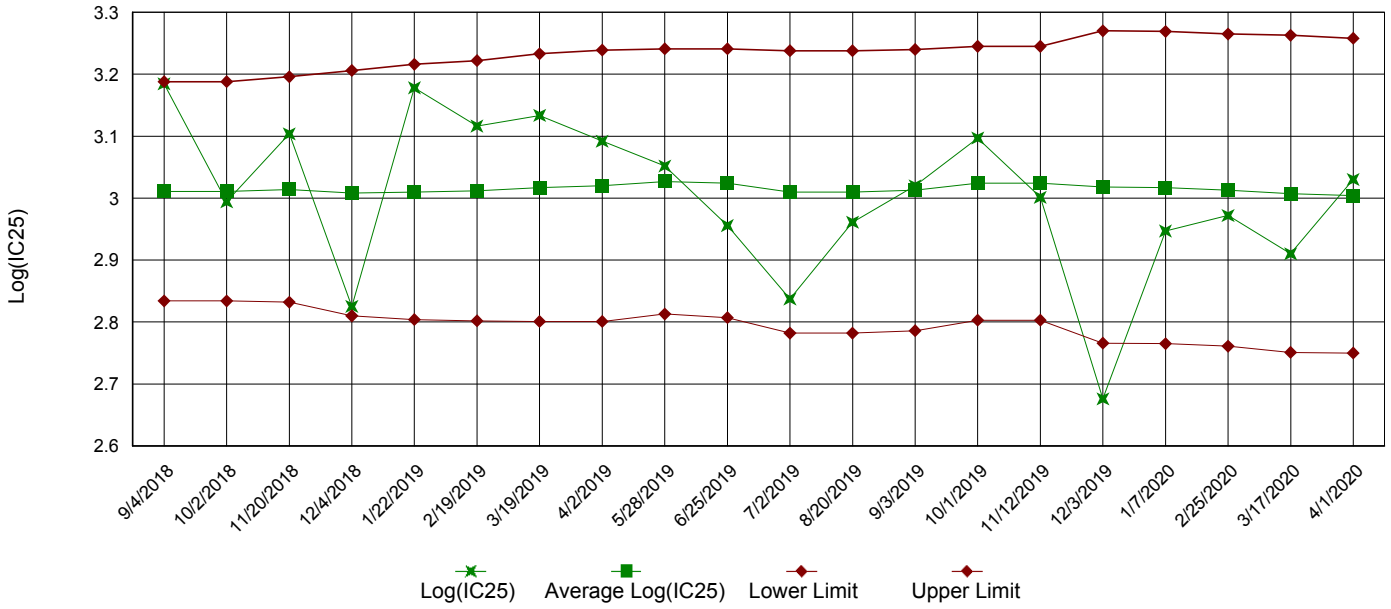
Appendix A3: Test 1002.0

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: City Water & Light of Jonesboro

NPDES No.: AR0043401 AFIN16-00936

Date and Time Test Initiated: April 21, 2020 at 0920
Date and Time Test Terminated: April 28, 2020 at 0920
Dilution water used: Moderately Hard

DATA TABLE FOR SURVIVAL

Effluent Conc. %	Percent Survival in replicate chambers A	B	C	D	E	Mean percent survival 24 hr	48 hr	7 days	CV%
Control	100	100	100	87.5	100	100	97.5	97.5	5.73
32 %	100	87.5	100	100	100	100	100	97.5	5.73
42 %	75.0	100	100	87.5	100	100	100	92.5	12.1
56 %	100	87.5	100	100	87.5	100	97.5	95.0	7.21
80 %	100	100	100	87.5	100	100	100	97.5	5.73
100 %	100	100	100	100	100	100	100	100	0.00

DATA TABLE FOR GROWTH

Effluent Conc. %	Average dry weight, mg replicate chambers A	B	C	D	E	Mean dry weight, mg	CV%
Control	0.568	0.546	0.534	0.431	0.545	0.525	10.3
32 %	0.489	0.486	0.558	0.592	0.574	0.54	9.12
42 %	0.390	0.508	0.586	0.515	0.501	0.5	14.1
56 %	0.551	0.450	0.582	0.592	0.482	0.531	11.8
80 %	0.522	0.562	0.572	0.416	0.522	0.519	11.9
100 %	0.488	0.626	0.540	0.570	0.525	0.55	9.43

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

2. Dunnett's Test:

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

   a.) LOW FLOW OR CRITICAL DILUTION (100 %) ____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: 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: 10.3 (TQP6C)

10. Lethality for this test: 100 % (51714 or 51714R)

11. Sublethality for this test: 100 % (51714 or 51714S)

AMERICAN INTERPLEX CORPORATION LABORATORIES

Appendix B: Test 1000.0

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

PERMITTEE: City Water & Light of Jonesboro
NPDES NO.: AR0043401 AFIN16-00936
CONTACT: Ms. Whitney Young
ANALYST: 280, 310, 343, 345

Test Initiated: DATE: April 21, 2020 TIME: 0920
Test Terminated: DATE: April 28, 2020 TIME: 0920

DILUTION Control		DAY 1	2	3	4	5	6	7
D.O.	Initial	0.0	7.7	7.6	7.6	6.6	7.7	7.1
	Final	6.7	6.4	6.9	5.9	6.9	6.6	6.6
pH	Initial	7.9	7.7	7.8	7.8	8.0	7.8	7.8
	Final	7.6	7.5	7.6	7.5	7.9	7.6	7.8

DILUTION 32 %		DAY 1	2	3	4	5	6	7
D.O.	Initial	8.0	7.7	8.1	7.4	6.9	7.2	7.5
	Final	6.7	6.3	5.9	5.8	7.3	6.9	7.0
pH	Initial	7.8	7.6	7.7	7.8	7.9	8.0	7.7
	Final	7.7	7.6	7.6	7.6	8.2	7.8	7.9

DILUTION 42 %		DAY 1	2	3	4	5	6	7
D.O.	Initial	7.8	7.6	8.2	7.6	7.2	7.3	7.5
	Final	6.7	6.0	5.6	5.6	7.0	6.5	6.8
pH	Initial	7.8	7.7	7.8	7.8	7.8	8.0	7.8
	Final	7.7	7.7	7.6	7.7	8.2	7.7	7.9

DILUTION 56 %		DAY 1	2	3	4	5	6	7
D.O.	Initial	8.2	7.7	8.3	7.8	7.1	7.3	7.5
	Final	7.0	6.5	6.0	5.9	7.0	6.5	6.8
pH	Initial	7.8	7.7	7.7	7.8	7.8	8.1	7.7
	Final	7.9	7.8	7.7	7.8	8.2	7.8	7.9

DILUTION 80 %		DAY 1	2	3	4	5	6	7
D.O.	Initial	8.2	7.5	8.3	7.7	7.5	6.9	7.4
	Final	6.7	6.1	6.4	5.6	7.0	6.4	6.7
pH	Initial	7.8	7.7	7.7	7.8	7.8	8.2	7.7
	Final	7.9	7.8	7.8	7.8	8.2	7.9	7.9

DILUTION 100 %		DAY 1	2	3	4	5	6	7
D.O.	Initial	8.3	7.8	7.5	7.4	6.4	6.8	7.4
	Final	6.6	6.4	5.6	5.4	6.6	6.4	7.1
pH	Initial	7.6	7.6	7.9	7.7	8.0	8.2	8.0
	Final	8.0	7.9	7.8	7.9	8.4	8.0	8.1

Alkalinity	Hardness	Conductivity	Chlorine	Sample ID
130	120	660	<0.05	East Plant 20-APR-20
120	180	710	<0.05	East Effluent 22-APR-20
100	100	600	<0.05	East Effluent 24-APR-20

Alkalinity	Hardness	Conductivity	Chlorine	Sample ID
60	88	310	<0.05	244541-1

Appendix B: Test 1002.0

SUMMARY REPORTING FORMS
CHRONIC BIOMONITORING
Ceriodaphnia dubia
SURVIVAL AND REPRODUCTION

Permittee: City Water & Light of Jonesboro

NPDES No.: AR0043401 AFIN16-00936

Date and Time Test Initiated: April 21, 2020 at 1000
Date and Time Test Terminated: April 27, 2020 at 0955
Dilution water used: Moderately Hard

PERCENT SURVIVAL

		Percent Effluent				
Time of Reading	Control	32 %	42 %	56 %	80 %	100 %
24 hour	100	90.0	90.0	80.0	70.0	90.0
48 hour	100	30.0	80.0	80.0	70.0	70.0
6 day	80.0	0.00	0.00	0.00	0.00	0.00

NUMBER OF YOUNG PRODUCED PER FEMALE @ 6 DAYS

		Percent Effluent				
Replicates	Control	32 %	42 %	56 %	80 %	100 %
A	26	0	0	0	0	0
B	29	0	0	0	0	0
C	27	0	0	0	0	0
D	17	0	0	0	0	0
E	25	0	1	0	0	0
F	0	0	0	0	0	0
G	25	0	0	0	0	0
H	23	0	0	0	0	0
I	32	0	0	0	0	0
J	26	0	0	0	0	0
Mean per Adult	23.0	0.00	0.100	0.00	0.00	0.00
Mean per Surviving Adult	26.6	0.00	0.00	0.00	0.00	0.00
CV %	10.4	0.00	0.00	0.00	0.00	0.00

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 %) X YES _____ NO
   b.) 1/2 LOW FLOW DILUTION (NA) _____ YES _____ NO

2.

   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 %) _____ 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]: 1 (TLP3B)

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

5. NOEC Ceriodaphnia Lethality: <32 % (TOP3B)

6. LOEC Ceriodaphnia Lethality: 32 % (TXP3B)

7. NOEC Ceriodaphnia Sublethality: <32 % (TPP3B)

8. LOEC Ceriodaphnia Sublethality: 32 % (TYP3B)

9. Coefficient of variation for Ceriodaphnia Reproduction: 10.4 (TQP3B)

10. Lethality for this test: <32 % (51710 or 51710P)

11. Sublethality for this test: <32 % (51710 or 51710Q)

AMERICAN INTERPLEX CORPORATION LABORATORIES

Appendix B: Test 1002.0

CHRONIC TOXICITY SUMMARY FORM
Ceriodaphnia dubia
CHEMICAL PARAMETERS CHART

PERMITTEE: City Water & Light of Jonesboro
NPDES NO.: AR0043401 AFIN16-00936
CONTACT: Ms. Whitney Young
ANALYST: 280, 310, 343, 345

Test Initiated: DATE: April 21, 2020 TIME: 1000
Test Terminated: DATE: April 27, 2020 TIME: 0955

DILUTION Control		DAY 1	2	3	4	5	6	7
D.O.	Initial	0.0	7.7	7.6	7.6	6.6	7.7	7.1
	Final	7.7	7.8	7.4	7.0	7.6	7.7	--
pH	Initial	7.9	7.7	7.8	7.8	8.0	7.8	7.8
	Final	8.0	8.3	8.3	8.3	8.2	8.0	--

DILUTION 32 %		DAY 1	2	3	4	5	6	7
D.O.	Initial	8.0	7.7	8.1	7.4	6.9	7.2	7.5
	Final	7.3	8.0	7.8	3.5	--	--	--
pH	Initial	7.8	7.6	7.7	7.8	7.9	8.0	7.7
	Final	8.3	8.4	8.4	8.0	--	--	--

DILUTION 42 %		DAY 1	2	3	4	5	6	7
D.O.	Initial	7.8	7.6	8.2	7.6	7.2	7.3	7.5
	Final	7.6	7.9	8.1	7.4	--	--	--
pH	Initial	7.8	7.7	7.8	7.8	7.8	8.0	7.8
	Final	8.4	8.4	8.5	8.4	--	--	--

DILUTION 56 %		DAY 1	2	3	4	5	6	7
D.O.	Initial	8.2	7.7	8.3	7.8	7.1	7.3	7.5
	Final	7.8	8.1	8.0	6.3	--	--	--
pH	Initial	7.8	7.7	7.7	7.8	7.8	8.1	7.7
	Final	8.4	8.5	8.5	8.4	--	--	--

DILUTION 80 %		DAY 1	2	3	4	5	6	7
D.O.	Initial	8.2	7.5	8.3	7.7	7.5	6.9	7.4
	Final	7.8	7.8	7.8	6.9	--	--	--
pH	Initial	7.8	7.7	7.7	7.8	7.8	8.2	7.7
	Final	8.4	8.6	8.6	8.6	--	--	--

DILUTION 100 %		DAY 1	2	3	4	5	6	7
D.O.	Initial	8.3	7.8	7.5	7.4	6.4	6.8	7.4
	Final	8.0	7.6	8.4	7.0	--	--	--
pH	Initial	7.6	7.6	7.9	7.7	8.0	8.2	8.0
	Final	8.5	8.6	8.7	8.6	--	--	--

Alkalinity	Hardness	Conductivity	Chlorine	Sample ID
130	120	660	<0.05	East Plant 20-APR-20
120	180	710	<0.05	East Effluent 22-APR-20
100	100	600	<0.05	East Effluent 24-APR-20

Alkalinity	Hardness	Conductivity	Chlorine	Sample ID
60	88	310	<0.05	244541-1

AMERICAN INTERPLEX CORPORATION
LABORATORIES

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: Jonesboro CWL
Project Reference: Biomonitoring / TKN
Project Manager: Whitney Young
Sampled By: Jody Gibson

PO No.

AIC CONTROL NO: 244575
AIC PROPOSAL NO:
Carrier:
Received Temperature C: 0.6

AIC No.	Sample Identification	Date/Time Collected	GRAB	COMP	SAMPLE MATRIX: WATER	SOIL	NO OF BOTTLES	C. dubia	P. promelas	TKN	Remarks
2	East Effluent	4/21-22/20 10 AM - 9 AM		X	X		3	X	X		Cl = 0.00
	West Influent	4/13-14/20 10 AM - 9 AM		X	X		1			X	
	East Influent	4/13-14/20 10 AM - 9 AM		X	X		1			X	
	Riceland Effluent	4/16-17/20 8 AM - 8 AM		X	X		1			X	AIC 244636
	West Influent	4/20-21/20 10 AM - 9 AM		X	X		1			X	
	East Influent	4/20-21/20 10 AM - 9 AM		X	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 A=(NH4)2, NH4OH

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]	4/22/20 12:46pm		
Relinquished By:	Date/Time	Received in Lab By: DANNY BROWN	Date/Time 4-22-20 1246

Comments:

FORM 0060

AMERICAN INTERPLEX CORPORATION
LABORATORIES

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: Jonesboro CWL
Project Reference: Biomonitoring
Project Manager: Whitney Young
Sampled By: Jody Gibson

PO No.

AIC CONTROL NO: 244575
AIC PROPOSAL NO:
Carrier:
Received Temperature C: 0.6

AIC No.	Sample Identification	Date/Time Collected	GRAB	COMP	SAMPLE MATRIX: WATER	SOIL		NO OF BOTTLES	ANALYSES REQUESTED: C. dubia	P. promelas	Remarks
3	East Effluent	4/23-24/20 10 Am-9 Am		X	X			3	X	X	Cl = 0.00
		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 A=(NH4)2, NH4OH

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
Matthew Hamett	4-24-2012:50PM		
Relinquished By:	Date/Time	Received in Lab By:	Date/Time
		PANNY BROWN	4.24.20 1250 PM

Comments:

FORM 0060

AMERICAN INTERPLEX CORPORATION
LABORATORIES

CHAIN OF CUSTODY / ANALYSIS REQUEST FORM

Client: City Water & Light
Project Reference: East WWTP Bio-Monitoring
Project Manager: Whitney Young
Sampled By: MH

PO No.

AIC CONTROL NO: 244515
AIC PROPOSAL NO:
Carrier:
Received Temperature C: 0.9
Remarks

AIC No.	Sample Identification	Date/Time Collected	GRAB	COMP	SAMPLE MATRIX: WATER	SOIL	NO OF BOTTLES	ANALYSES REQUESTED: P. Pramelas	C. Dubia
1	East Plant Bio	4/19-20/20 10:00am-9:00am		X	X		3	X	X
		Container Type					P		
		Preservative					NO		

Field pH calibration
on _____ @ _____
Buffer:

G = Glass P = Plastic V = VOA vials H = HCl to pH2 T = Sodium Thiosulfate
NO = none S = Sulfuric acid pH2 N = Nitric acid pH2 B = NaOH to pH12 Z = Zinc acetate A=(NH4)2, NH4OH

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
	4/20/20 12:00pm		
Relinquished By:	Date/Time	Received in Lab By:	Date/Time
		D. BROWN	4.20.20 1210 PM

Comments:

FORM 0060