

Forrest City Water Utility 303 N. Rosser St. Forrest City, AR 72335

10/24/2014

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

Transmittal Letter

Please find enclosed for your distribution the following:

SEMI-ANNUAL 2014 CHRONIC WET TEST REPORT

Sincerely,

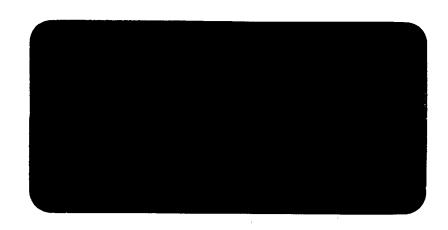
Forrest City Water Utility

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Huther and Associates, Inc.

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#### CITY OF FORREST CITY **OUTFALL 001**

Chronic Biomonitoring Report Permit Number NPDES AR0020087 AFIN Number: 62-00070

> Ceriodaphnia dubia Pimephales promelas

September 30, 2014

FORREST CITY WATER

OCT 1.7 2014

CASH CHECK CHE

Reviewed by:

Toni Nesbitt, QA/QC Officer

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environmental toxicologists, biologists, and consultants

#### TOXICITY TEST REPORT - CHRONIC

Client	City of Forrest City	Laboratory I.D	22899
	NPDES AR0020087	Begin Date	September 30, 2014
Sample	Outfall 001		

Results: Pass Ceriodaphnia dubia survival and reproduction and Pimephales promelas survival and growth at the critical low flow concentration (100% effluent).

### SAMPLE COLLECTION

Composite effluent samples from City of Forrest City were delivered by Greyhound Package Express courier to Huther & Associates on September 30, October 2 and October 4, 2014. Effluent samples were collected and composited from Outfall 001 using an automatic sampler. Two toxicity tests were requested: a seven-day Ceriodaphnia dubia survival and reproduction test (EPA Method 1002.0), and a seven-day Pimephales promelas larval survival and growth test (EPA Method 1000.0). Test organisms, procedures and quality assurance requirements were in accordance with the EPA manual, "Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms, Fourth Edition" (EPA-821-R-02-013).

The effluent samples were analyzed for total residual chlorine (Standard Methods, 22<sup>nd</sup> Edition, 4500-Cl D) and contained <0.01 mg/L, <0.01 mg/L, and <0.01 mg/L, respectively. Effluent and laboratory dilution water hardness, alkalinity, conductivity, pH, and dissolved oxygen data were collected and recorded.

TEST SETUP Ceriodaphnia dubia



The seven-day *Ceriodaphnia dubia* survival and reproduction test was initiated at 1400 hours, September 30, 2014. Five concentrations were prepared (32%, 42%, 56%, 75%, 100% effluent) utilizing distilled, deionized laboratory water reconstituted to match the hardness, alkalinity and pH of the receiving stream (unnamed tributary of L'Anguille River). The test was conducted in 25 mL distilled water rinsed plastic beakers containing 15 mL of solution (one organism per beaker, ten beakers per concentration). *C. dubia* neonates were less than 24 hours old and within eight hours of the same age at test initiation. Neonates were placed in beakers following a randomized block test design. Fresh solutions were prepared and renewed daily. Daily feeding consisted of 0.5 mL *Selenastrum capricornutum* and cerophyll per test chamber. The test proceeded for seven days during which survival, reproduction and water quality data were collected daily.

No Observable Effect Concentration (NOEC).

A control of 10 replicate beakers containing one neonate each in distilled, deionized, reconstituted water (same as diluent) was conducted concurrently with the test. There was 100% survival in the control. The test ended at 1400 hours, October 7, 2014. Survival and reproduction data were statistically analyzed (p = 0.05) according to EPA procedures to determine the Lowest Observable Effect Concentration (LOEC) and the

SURVIVAL Ceriodaphnia dubia There was 100% survival to *C. dubia* in all of the effluent concentrations tested. Therefore, statistical analyses were not required to determine a no effect concentration.

LOEC: Not Applicable NOEC: 100% Effluent

REPRODUCTION Ceriodaphnia dubia C. dubia reproduction data failed Chi-Square test for normality at the 0.01 alpha level (13.277). Bartlett's test for homogeneity is sensitive to nonnormal data and should not be performed on the non-normally distributed data. Therefore, a nonparametric test was performed on the data. Steel's Many-One Rank test on C. dubia reproduction data demonstrated that there were no statistically significant differences between the control and any of the effluent concentrations.

LOEC: Not Applicable NOEC: 100% Effluent

PMSD: 10.6%

Test Date: September 30, 2014

TEST SETUP

Pimephales promelas



The seven-day *Pimephales promelas* larval survival and growth test was initiated at 1450 hours, September 30, 2014. Five concentrations were prepared (32%, 42%, 56%, 75%, 100% effluent) utilizing distilled, deionized laboratory water reconstituted to match the hardness, alkalinity and pH of the receiving stream (unnamed tributary of L'Anguille River). The test was conducted in 300 mL distilled water rinsed plastic beakers containing 250 mL of solution (eight larvae per beaker, five beakers per concentration). *P. promelas* larvae were less than 24-hours old at test initiation and originated from a minimum of three in-house spawnings. Fresh solutions were prepared and renewed daily. Larvae in each test chamber were fed <24-hour-old *Artemia* (brine shrimp) three times per day. The test proceeded for seven days during which survival and water quality data were collected daily.

A control of five replicate chambers containing eight larvae each in distilled, deionized, reconstituted water (same as diluent) was conducted concurrently with the test. There was 100% survival in the control. The test ended at 1450 hours, October 7, 2014. At test termination, all larvae were sacrificed, dried for 24-hours, and weighed. Survival and growth (weight) data were statistically analyzed (p = 0.05) according to EPA procedures to determine the Lowest Observable Effect Concentration (LOEC) and the No Observable Effect Concentration (NOEC).

Test Date: September 30, 2014

### SURVIVAL Pimephales promelas

There was 100% survival to *P. promelas* in all of the effluent concentrations tested. Therefore, statistical analyses were not required to determine a no effect concentration.

LOEC: Not Applicable NOEC: 100% Effluent

### GROWTH Pimephales promelas

P. promelas growth data were normally distributed at the 0.01 alpha level (0.900) using Shapiro Wilk's test for normality. Growth data were homogeneous using Bartlett's test at the 0.01 alpha level (15.09) without data transformations. Therefore, a parametric test was performed on the homogeneous data. Dunnett's test on P. promelas growth data demonstrated that there were no statistically significant differences between the control and any of the effluent concentrations.

LOEC: Not Applicable NOEC: 100% Effluent

PMSD: 8.9%

#### **SUMMARY**

There were no statistically significant differences between the control and the critical low flow concentration (100% effluent) for *C. dubia* survival and reproduction and *P. promelas* survival and growth. Based on biomonitoring requirements for Outfall 001 contained in Permit Number NPDES AR0020087 for City of Forrest City, Outfall 001 passed for this testing period.

#### Huther and Associates

### 7-Day/3 Brood Ceriodaphnia dubia Survival and Reproduction Chronic Toxicity Test

CLIENT City of Forrest City	SAMPLE TYPE 24 Hour Composite
NPDES # AR0020087/	DATE COLLECTED 09/29/14 10/01/14 10/03/14
LAB ID # 22899	DATE RECEIVED 09/30/14 10/02/14 10/04/14
TEST TYPE J Day Chronic	BEGIN DATE/TIME (09/30/14/1400)
TEST ORGANISM Ceriodaphnia dubia	END DATE/TIME 10/07/14 1400
ORGANISM AGE < 24 Hours	TEST TEMPERATURE (°C) 25 ±1
ORGANISM SOURCE In House	PHOTO PERIOD 16-hr, Light 8-hr, Dark
RECEIVING WATERunnamed tributary of L'Anguille River.	LIGHT INTENSITY 50 100 ft cod
DILUTION WATER Laboratory Adjusted	TECHNICIAN N. Lehr

#### SURVIVAL & REPRODUCTION SUMMARY

Control												
Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 16	Rep 7	Rep 8	Rep 9	Rep 10		
	Α	Α	Α	Α	A.	Α	Α	A	Α	Α		
10/01/14	₩ <b>0</b> *	003	0	€0∄	<b>1</b> 03	0.	o S	<b>*0</b>	<b>%</b> 0%	数0数		
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10/06/14	9-	. 9 *	\$12°	<b>/12</b>	613	10	×111	¥12×	9	9,		
	12	12	13	13	13	12	11	13	12	11		
10/07/14	》21號	₹21	25:	; 125}	<b>∦26</b> ∤	*22	∜22÷	25	- 214	÷20.		
		x # Yo	oung	22.8			C.V.	9.65%	6			
		x% Sı	ırvival	100%			C.V.	0.00%	6			

32% Effluent													
Date	Rep	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10			
	Α	Α	Α	A	Α	Α	Α	Α	Α	Α			
10/01/14	0.	#\0°	<b>10</b>	600%	0	<b>⊘</b> 0₃	(40年	<b>(0</b> )	<b>₩</b> 0\$	ŊO,			
	Α	Α	Ä,	A	Α	A	Α	Α	Α	Α			
10/02/14	0.	(10)	*0	6 O.	Ø.	×0.	<b>₩0</b>	<b>*</b> 0	9	O			
	Α	Α	Α	Α	Α	Α	Α	Α	Α	Α			
10/03/14	0.	0.2	<b>0</b>	壁0線	<b>(,0</b> )*	※0例	與0年	<b>3</b> 0	<b>X0</b>	<b>湖</b> 0			
	3	2	3	3	Α	2	3	2	4	Α			
10/04/14	-3-	25	33	號3號	<b>30</b> 3	%2∞	233 €	2	4	<b>淡</b> O			
	Α	Α	Α	Α	4	8	Α	Α	Α	4			
10/05/14	3∂	2.	3	£3°	<b>44</b> 2	(10)	3.3	*2*	4	-4			
	7	10	8	9	11	Α	7	11	11	8			
10/06/14	10	12.	Mile.	翔2	115	(10	§310 €	沙13等	15	12			
	12	13	11	12	13	14	13	13	12	12			
10/07/14	<b>#22</b>	525⅓	<b>∦22</b> □	24	28	424	23	26	275	24			
		x#Yo	oung	24.5			C.V.	8.22%	<b>5</b>				
		x% Su	ırvival	100%			C.V.	0.00%	<b>.</b>				

				42% E	ffluent					
Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep y 5	Rep 6	Rep ≄7	Rep 8	Rep 9	Rep ⊴10
	Α	Α	A	Α	Α	A	Α	Α	Α	Α
10/01/14	³ 0' ŝ	<b>₩</b> 0	* O	0.	<b>#0</b> :	£*0*	がの後	∜0%	<b>●/0</b>	O
	A	Α	A	Α	Α	Α	Α	Α	Α	Α
10/02/14	70	. 0	0.5	O	Ş O	类0为	0	(On	*• O	# O
	A	A	A	Α	Α	Α	Α	Α	Α	Α
10/03/14	<b>#</b> 0⊁	€0.9	<b>\$0</b> %	o S	<b>%</b> 0₹	S 0	0.	<b>10</b>	0	线06
	3	Α	A	Α	Α	Α	4	Α	3	Α
10/04/14	<b>≋3</b> fi	0	<b>30</b>	0	10	<b>60</b>	4	<b>€</b> 00	<b>%3</b> #	<b>*10</b>
	Α	4	3	3	2	3	A	3	A	4
10/05/14	3.	* 4 1	133	3	2	3₩	4	∜3.	3	1.4
	6	8	11	6	7	6	9	10	9	9
10/06/14	<b>3</b> 9	124	214	9	<b>∷9</b> ⊭	<b>%</b> .9;	<b>13</b> 6	<b>313</b>	12	<b>%13</b>
	12	11	13	14	12	11	13	15	12	12
10/07/14	\$218	23.	27	<b>7 23</b> ₹	思21度	<b>∤20</b> ≟	26	-28	24	<b>#25</b>
		x # Yo	oung	23.8			c.v.	11.34	%	
		x% Sı	ırvival	100%			C.V.	0.00%	•	

			56% E	ffluent					
Rep	Rep 2	Rep 3	Rep 4	Rep 25	Rep 6	Controvers.	Rep 8	Late Deden	Rej 10
Α	Α	Α	Α	Α	Α	Α	Α	Α	A
0	<b>*10</b> *	0.	9 <b>7</b> 0%	绒0点	②0件	0	0	图0篇	¢.O
Α	Α	A	Α	Α	Α	Α	Α	Α	Α
* O	0	₩0	<b>₩0</b>	0	<b>0</b> ∜	£0≇	<b>#0</b> ?	0.0	<b>10</b>
Α	Α	Α	Α	Α	Α	Α	Α	Α	Α
10%	10	¥0	∲(0#	<b>0</b> ≥	2 Of	60岁	0	<b>⊕0</b> ≇	(3.0)
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;;3 <i>₽</i>	4.4	4	73	4.2	<b>第5</b> 数	3.	4.	#:3₺	3
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12	14	12	13	12	14	12	12	13	12
<b>23</b> 5	29 ≥	26	₹23	522	图27条	7.22₹	25	(26)	, 23
	x#Yo	ung	24.6			C.V.	9.62%	<b>.</b>	
	x% Su	ırvivat	100%			C.V.	0.00%	5	
	A 0 A 0 A A 3 A A B B 11	A A A O O O O O O O O O O O O O O O O O	Rep   Rep   Rep   3   3   3   4   4   4   3   2   4   12   12   14   12   23   29   26   3   3   4   4   4   4   4   4   4   4	Rep	Rep         Rep <td>Rep: Rep: Rep. Rep. Rep. Rep. 14 25 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6</td> <td>Rep:         Rep:         <th< td=""><td>Rep.         Rep.         <th< td=""><td>Rep   Rep   Rep  </td></th<></td></th<></td>	Rep: Rep: Rep. Rep. Rep. Rep. 14 25 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6 6	Rep:         Rep: <th< td=""><td>Rep.         Rep.         <th< td=""><td>Rep   Rep   Rep  </td></th<></td></th<>	Rep.         Rep. <th< td=""><td>Rep   Rep   Rep  </td></th<>	Rep   Rep

here: A = Alive

5 = Alive, 5 young

D = Dead

D5 = 5 Young, Female died

ex 1:

A alive today
4 total young to date

ex 2:

5 alive, 5 young today 12 total young to date

# Huther and Associates 7-Day/3 Brood Ceriodaphnia dubia Survival and Reproduction Chronic Toxicity Test

City of Forrest City

Lab ID# 22899

Test Date: September 30, 2014

75% Effluent													
Date	Rep 1	Rep	Rep ∴3.	Rep 4	Rep 5.	Rep 6	Rep ≱7.a	Rep ∙.8⊀	Rep 9	Rep 10			
	Α	Α	Α	A	Α	Α	Α	A	Α	Α			
10/01/14	線の際	<b>₹0</b> ₩	ĝ.0∷	∜0.4	₹0#	€0₹	410	<b>经0</b> 净	<b>#10</b>	₹ 0>			
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	12	13	14	13	12	14	15	13	12	12			
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		x# Y	oung	23.5			C.V.	9.25%	6				
		x% S	urvival	100%			C.V.	0.00%	6				

Date	Rep Col.	Rep 2	Rep 3.4	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep	Rep -10
10 Sales - 12 to 22 2	Α	Α	Α	Α	Α	Α	Α	Α	A	Α
10/01/14	<b>₩0</b> 0	<b>%0</b> %	0.	<b>6</b> `0;	26.01	<b>∴</b> 075	0	%0 §	<b>107</b>	<b>6</b> 10 €
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	Α	Α	Α	Α	Α	Α	Α	Α	Α	Α
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	2	4	3	2	Α	Α	2	Α	3	3
10/04/14	32%	4.4	5-3.∜	對2章	0	#20k	±2:	<b>60</b> /	573₹	<b>₹3</b> ₹
	7	Α	Α	Α	4	3	Α	5	Α	Α
10/05/14	<b>\$9</b> .5	4	<b>%36</b>	€2.	<b>42</b>	<b>%3</b> }∫	位2数	₩5*	2130	<b>∴3</b> ¥
	Α	6	11	8	9	6	6	7	8	11
10/06/14	€9*	:10	7141	<b>*10</b> ;	√13≁	9.9	學8点	学12以	潮北	14
	12	13	12	12	14	12	12	14	13	12
10/07/14	<b>21</b> 4	₹23	. 26∄	22	2,27%	第21条	<b>#20</b> }	₹26 ₹	24,	≇ 26 <sub>4</sub>
		x# Yo	oung	23.6			C.V.	10.79	%	
		x% S	urvival	100%			C.V.	0.00%	6	

100% Effluent

where:	A = Alive	ex 1:	ex 2:
	5 = Alive, 5 young	A alive today	5 alive, 5 young today
	D = Dead	4 total young to date	12 total young to date
	D5 = 5 Young, Female died	<del></del>	

# Huther and Associates 7-Day/3 Brood Ceriodaphnia dubia Survival and Reproduction Chronic Toxicity Test

City of Forrest City

Lab ID# 22899

Test Date: September 30, 2014

#### WET CHEMISTRY MEASUREMENTS

Date	Times	* Temp	Samp.			pH of S	olution;	ANYO		Analyst
			No.	CON	32%	42%	56%	: 275% <sub>**</sub>	100%	
09/30/14	Start	25.5	1	8.25	8.24	8.23	8.25	8.26	7.92	CS
10/01/14	24 Hr %	24:9	HALL TO	8.21.	8.37	8.46	8.51	8:56	8.62	. WLB
10/01/14	Renew	24.9	1	8.01	8.02	8.04	8.03	8.04	8.04	WLB
1.10/02/14	3.48 Hr. 🔭	24.8		8.18	8.24	8.27	8.28	i 8.35	8.43	WLB:
10/02/14	Renew	25.0	2	7.93	8.01	8.02	8.03	8.02	8.04	WLB
10/03/14	72'Hr.	25:1	5,245	8:26	8.077	**************************************	#ir 8.50i7 J.	.8.56	8.63	EMS
10/03/14	Renew	25.1	2	7.82	7.83	7.91	7.92	7.92	7.89	EMS
10/04/14	96 Hr 1	24.3 Tr	1/22	7.781	£21.79, \$	.¥27.83 •∑	7:85	<i>3.7</i> .89	7.93	, CŠ
10/04/14	Renew	24.3	3	7.76	7.73	7.68	7.65	7.71	8.04	CS
10/05/14	120 Hr 1	25.2	学的影響	\$7.90	8.09	8.21	8.24	8:28.	∜8.39 %	PEMS:
10/05/14	Renew	25.2	3	8.11	8.16	8.18	8.19	8.19	8.12	EMS
10/06/14	144 Hr.:	25.23	3.8	47.96	8.07	8.15	* (8.18)	8.24	8.31	EMS*
10/06/14	Renew	25.2	3	8.02	8.03	8.04	8.03	8.04	7.99	EMS
10/07/14	1,168 Hr.	25.7	rak-350	8:150	8.25	8.27	8.28	2.8.26	8:23	E CS.

5 Date			Samp			DÓ (mg/L)	of Solution	ar en e		Analyst
Part of	Time	Temp.	No.	CON	32%	₹42%	56%	75%	100%	Allalyst
09/30/14	Start	25.5	1	8.00	8.04	8.03	8.02	8.11	8.50	CS
3 10/01/14%	24 Hr. i	24.9	121	8.12	1.8.24 E	8.24	8.25	8.02	8.14	WLB
10/01/14	Renew	24.9	1	8.49	8.50	8.56	8.85	8.65	8.92	WLB
10/02/14/1	* 48 Hr; *	24:8	District.	8:23	8.25 →	8.10	3,8.14	8.08	8.08	WLB
10/02/14	Renew	25.0	2	8.30	8.65	8.70	8.89	8.62	8.85	WLB
110/03/14	72 Hr!	25.15	2.24	#7,79 <sub>2</sub> 1	8.40.	设行:576学	<b>多7.72</b> 製	8:28,5	\$ 8:01	EMS.
10/03/14	Renew	25.1	2	8.41	8.47	8.58	8.61	8.56	8.77	EMS
10/04/14	. 96 Hr.	24.3	122	18.32	8.41	8:52	8:59	8.53	8.47	· CS
10/04/14	Renew	24.3	3	8.22	8.32	8.48	8.52	8.40	8.87	CS
10/05/14	120 Hr.	25.24	/3/13	~ 8.83×.	8:752	8.97.	€.8.85.¢	8.84	8.99	EMS.
10/05/14	Renew	25.2	3	7.87	8.94	8.51	8.68	8.73	8.63	EMS
10/06/14	144 Hr	25.2	1 73E	8:16	8.92	8.87	8:93	148.96	8.55	EMS
10/06/14	Renew	25.2	3	8.50	8.15	7.74	8.26	8.73	8.50	EMS
10/07/14	168 Hr.	25.74	*#31¥	7,97	7.93	8:03	8.00	8.01	8:23	CS Fig.

# Huther and Associates 7-Day/3 Brood Ceriodaphnia dubia Survival and Reproduction Chronic Toxicity Test

City of Forrest City

Lab ID# 22899

Test Date: September 30, 2014

### INITIAL CHEMISTRY MEASUREMENTS @ 100% EFFLUENT

Date V-	y Samp.ℓ!	pH	, DO	Hardness; mg/L CaC03	Alkalinity, mg/L CaCO3 188	Conduct. umhos/cm	Resid Cl2 mg/L	Dechlor(ml:) ve Na2S2O3 mg/L <sup>1</sup>	Analyst
09/30/14:	1	7.92	8.50	272	252	843	< 0.01	N/A	TN
10/02/14	2	8.04	8.85	280	258	838	< 0.01	N/A	TN
10/04/14		8.04	8.87	280	262	837	< 0.01	N/A	TN
- 09/30/14 *	_	8.25	8.00	100	96	383	-	-	TN

<sup>&</sup>lt;sup>1</sup> Measurements taken in 100% solution.

Huther and Associates, Inc.

Begin Date: September 30, 2014

Lab I.D.# 22899

### CERIODAPHNIA DUBIA STATISTICAL ANALYSES Reproduction

Summary Statistics on Transformed Data Table 1 of 2

Grp	Identification	N	Min	Max	Mean
1	Control	10	20.000	26.000	22.800
2	32% Effluent	10	22.000	28.000	24.500
3	42% Effluent	10	20.000	28.000	23.800
4	56% Effluent	10	22.000	29.000	24.600
5	75 Effluent	10	21.000	27.000	23.500
6	100% Effluent	10	20.000	27.000	23.600

Chi-Square Test For Normality: Actual And Expected Frequencies

Interval :	< -1.5	<u>-1.5 to -0.5</u>	<u>-0.5 to 0.5</u> .	>0.5 to 1.5	<u>&gt;1.5</u>
Expected	4.020	14.520	22.920	14.520	4.020
Observed	0	24	15	16	5

Calculated Chi-Square goodness of fit test statistic = 13.3359Table Chi-Square value (alpha = 0.01) = 13.277

Data Fail normality test. Try another transformation.

Summary Statistics on Transformed Data Table 2 of 2

Grp	Identification	Variance	<u>Sd</u>	Sem	<u>C.V.%</u>
1	Control	4.844	2.201	0.696	9.65
2	32% Effluent	4.056	2.014	0.637	8.22
3	42% Effluent	7.289	2.700	0.854	11.34
4	56% Effluent	5.600	2.366	0.748	9.62
5	75 Effluent	4.722	2.173	0.687	9.25
6	100% Effluent	6.489	2.547	0.806	10.79

Steel's Many-One Rank Test - Ho:Control < Treatment

		Transformed	<u>Rank</u>	<u>Crit.</u>		
Grp	Identification	Mean	Sum	<b>Value</b>	$\underline{\mathbf{Df}}$	Sig
1	Control	22.800				
2	32% Effluent	24.500	126.00	75.00	10.00	
3	42% Effluent	23.800	115.50	75.00	10.00	
4	56% Effluent	24.600	129.50	75.00	10.00	
5	75 Effluent	23.500	117.00	75.00	10.00	
6	100% Effluent	23.600	116.00	75.00	10.00	

Critical values use k = 5, are 1 tailed, and alpha = 0.05 No statistically significant difference

# Huther and Associates 7-Day Pimephales promelas Survival and Growth Chronic Toxicity Test

CLIENT City of Forrest City	SAMPLE TYPE 24 Hour Composite
NPDES # AR0020087	DATE COLLECTED   09/29/14 10/01/14 10/03/14
LAB ID # 22899	DATE RECEIVED 09/30/14 10/02/14 10/04/14
TEST TYPE 7/Day Chronic	BEGIN DATE/TIME 09/30/14/1450
TEST ORGANISM Pimephales promelas	END DATE/TIME 10/07/14 1450
ORGANISM AGE	TEST TEMPERATURE (°C) 25±1
ORGANISM SOURCE In House	PHOTO PERIOD 16-hr Light 8-hr Dark
RECEIVING WATER Junnamed tributary of the Languille River	LIGHT INTENSITY 50-100 in codile
DILUTION WATER Laboratory Adjusted	TECHNICIAN L. Brandon.

#### SURVIVAL SUMMARY

<u> </u>	Cons. 10/01/14/2013						新华等等10/03/14型量。		10/0	4/14		(2012年) 10/05/14 (2015)		
Conc.	A B FC D PB	Α	В	С	D	Е	FAX FB: IC FD E	Α	В (	D	E	A B C ED EV		
Con	8 8 8 8	8	8	8	8	8	8 8 8 8	8	8 8	8	8	8 8 8 8 48		
32%	8 8 8 8 8 8	8	8	8	8	8	8 8 8 8	8	8 8	8	8	8 8 8 8 8		
42%	8 8 8 8 8	8	8	8	8	8	8# 28 28	8	8 8	8	8	81 8 8 8 8		
56%	8 8 8 8	8	8	8	8	- 8	8 8 48 8 28	8	8 8	8	8	80 187 18 18. 28		
75%	8 8, 18, 8 8	8	8	8	8	8	8 8 8 8 8	8	8 8	8	8	80 8 8 48 8		
100%	8 8 8 8	8	8	8	8	8	8 8 8 8 8 8	8	8 8	8	8	8 8 8 8 8		

C	10/06/14	10/07/14					х %	C.V. %
Conc.	A B ZC ZD E	Α	В	С	D	Е	Survival	C. V. 70
Con	84 8 8 8 8 8 8 8 8 8 8	8	8	8	8	8	100.0	0.00
32%	8 8 8 8 8	8	8	8	8	8	100.0	0.00
42%	8 28 58 8 8	8	8	8	8	8	100.0	0.00
56%	8 8 8 8 8	8	8	8	8	8	100.0	0.00
75%	8 8 8 8 8 8	8	8	8	8	8	100.0	0.00
100%	8 8 8 8	8	8	8	8	8	100.0	0.00

#### MEAN DRY WEIGHT PER REP

% Effluent	Rep A	Rep B	Rep Ch	Rep D	:=□ Rep E 🛴	ales (x4	
Con A	0.4820	0.4250	0.4170	0.4860	0.4290	0.4478	7.45
32%	0.4450	0.4760	0.5010	0.4460	0.4750	0.4686 .	5.02
42%	0.4780	0.5030	0.4650	0.4760	0.4920	0.4828	3.07
56%	0.4560	0.5020	0.4450	0.4690	0.4820	0.4708	4.73
75%	0.5040	0.4460	0.4710	0.4520	0.5030	0.4752	5.77
2100%	0.4160	0.4490	0.5020	0.4860	0.4450	0.4596	7.48

# Huther and Associates 7-Day *Pimephales promelas* Survival and Growth Chronic Toxicity Test

City of Forrest City

Lab ID# 22899

Test Date: September 30, 2014

#### WET CHEMISTRY MEASUREMENTS

Date 1.	Time *	Temp;	Samp +			† pH of S	Solution			Analyst
Date			No:	CON	32%	42%	56%	75%	د 100%	Alkalyst
09/30/14	Start	25.5	1	8.25	8.24	8.23	8.25	8.26	7.92	CS
- 10/01/14	24 Hr.%.5	25.4		7.56	7.57	8.08	8.14	8.22	≥ 8.27	WLB
10/01/14	Renew	24.9	1	8.01	8.02	8.04	8.03	8.04	8.04	WLB
÷10/02/14	√48 Hr*5.	25.5	<b>1975</b>	7.97	8.22 M	8:31	\$\$ 8.37° \$	. 8.42 <sup>4</sup> ?	8.47	J. WLB.
10/02/14	Renew	25.0	2	7.93	8.01	8.02	8.03	8.02	8.04	WLB
10/03/14;	72 Hr.	25.0	2	¥ +7:88	7.89	7.98	8.04	\$ 8.03 h	6 8.13	EMS
10/03/14	Renew	25.0	2	7.82	7.83	7.91	7.92	7.92	7.89	EMS
/110/04/14	96 Hr. j.	24.3	2.5	7,594	17.61	7.65%	7.66	5,7.69 A	7.72	cs is
10/04/14	Renew	25.0	3	7.76	7.73	7.68	7.65	7.71	8.04	CS
10/05/14	120 Hr.	25.0	233.4	3731	÷8.18₽	8.20	8.18	8.34	8.28	EMS.
10/05/14	Renew	25.0	3	8.11	8.16	8.18	8.19	8.19	8.12	EMS
10/06/14	144 Hr	25:5	34,2	7.65	* 8.08	8.09	8.10	8.22	8.24	EMS
10/06/14	Renew	25.5	3	8.02	8.03	8.04	8.03	8.04	7.99	EMS
10/07/14	,168 Hr	25.7	<b>福沙</b>	8.54	8.55	8.58	8.67	8.63	8.44	cs ,
Date**	Time	Temp	Samp.			DO (mg/L)	of Solution	ic 147/2	100 A	Analyst
			No.	CON.	32%-2	42%	\$ 56% · \	75%	7100%	

Date	Time	Temps	Samp.			DO (mg/L)	of Solution			Analyst
1.70			No.	CON	32% 🗈	42%	56%	75%	<b>#100%</b>	
09/30/14	Start	25.5	1	8.00	8.04	8.03	8.02	8.11	8.50	CS
#10/01/145¥	7, 24 Hr.:	±25.4		7.92	8:10	7.96	7:7:16/	7.21	7.84	wlb:
10/01/14	Renew	24.9	1	8.49	8.50	8.56	8.85	8.65	8.92	WLB
10/02/14:1	48 Hr.	25.5	#118#7	8:94	8.55	8.467	875	8.53	V <sub>1</sub> ,7,87	WLB
10/02/14	Renew	25.0	2	8.30	8.65	8.70	8.89	8.62	8.85	WLB
10/03/14	72 Hr. &	25.0	2 2 3 4	8:85	28.89	a. 8:10 . ·	772	77.71	7.86	EMS
10/03/14	Renew	25.0	2	8.41	8.47	8.58	8.61	8.56	8.77	EMS
10/04/14	296 Hr 7,	1,24.3	223	1 7.74 ·	7.76%	/ <b>7</b> .80	7.86	7:92:	8:08	€7 - CS∋1, <sub>4</sub> .
10/04/14	Renew	25.0	3	8.22	8.32	8.48	8.52	8.40	8.87	CS
10/05/14/4	120 Hr 🐍	25.0	<b>333</b> 3	8.67	8.30	8.66	8.52	1-8.95	8.34 Fa	EMS
10/05/14	Renew	25.0	3	7.87	8.94	8.51	8.68	8.73	8.63	EMS
10/06/14	144 Hr.	25.5	37.5	₫,8.75	8.17	8.20	8.19- <sub>5</sub> .	:≰ 8.38 <del>,</del> ₹	8.42	EMS <sup>2</sup>
10/06/14	Renew	25.5	3	8.50	8.15	7.74	8.26	8.73	8.50	EMS
10/07/145	168 Hr.,	25.7	e 13° 3	7.715	7,75,64	27:82	, k.7:81.	7: <b>7</b> :86	8.01	es:

# Huther and Associates 7-Day *Pimephales promelas* Survival and Growth Chronic Toxicity Test

City of Forrest City

Lab ID# 22899

Test Date: September 30, 2014

#### INITIAL CHEMISTRY MEASUREMENTS @ 100% EFFLUENT.

Date	Samp:	pH .	DO P	Hardnessi mg/L: CaC03	Alkalinity mg/L CaCO3t	Conduct. umhos/cm <sup>1</sup>	* Resid: Cl2 mg/L: 1	Dechlor(mL) Na2S2O3 mg/L <sup>21</sup>	Analyst
609/30/14	1	7.92	8.50	272	252	843	< 0.01	N/A	TN
10/02/14	2	8.04	8.85	280	258	838	< 0.01	N/A	TN
10/04/14	3	8.04	8.87	280	262	837	< 0.01	N/A	TN
09/30/14	Con	8.25	8.00	100	96 <sup>-</sup>	383	-	-	TN

<sup>&</sup>lt;sup>1</sup> Measurements taken in 100% solution.

Huther and Associates, Inc.

Begin Date: September 30, 2014

Lab I.D.# 22899

#### PIMEPHALES PROMELAS STATISTICAL ANALYSES Growth

Summary Statistics on Transformed Data Table 1 of 2

Grp	Identification Control	<u>N</u> 5	Min 0.417	<u>Max</u> 0.486	Mean 0.448
2	32% Effluent	5	0.445	0.501	0.469
3	42% Effluent	5	0.465	0.503	0.483
4	56% Effluent	5	0.445	0.502	0.471
5	75% Effluent	5	0.446	0.504	0.475
6	100% Effluent	5	0.416	0.502	0.460

ANOVA Table

SOURCE	DF	SS	MS F
Between	5	0.004	0.001 1.051
Within (Error)	24	0.017	0.001
Total	29	0.021	

Critical F value = 2.62 (0.05,5,24)

Since F < Critical F Fail to Reject Ho: All equal

Summary Statistics on Transformed Data Table 2 of 2

Grp	Identification	<u>Variance</u>	<u>Sd</u>	<u>Sem</u>	<u>C.V.%</u>
1	Control	0.001	0.033	0.015	7.45
2	32% Effluent	0.001	0.024	0.011	5.02
3	42% Effluent	0.000	0.015	0.007	3.07
4	56% Effluent	0.000	0.022	0.010	4.73
5	75% Effluent	0.001	0.027	0.012	5.77
6	100% Effluent	0.001	0.034	0.015	7.48
4 5	32% Effluent 42% Effluent 56% Effluent 75% Effluent	0.001 0.000 0.000 0.001	0.024 0.015 0.022 0.027	0.011 0.007 0.010 0.012	5.02 3.07 4.73 5.77

Dunnett's Test - Table 1 of 2 Ho:Control < Treatment

			<u>Mean</u>		
		<b>Transformed</b>	Calculated In		
Grp	Identification	Mean	Original Units	T Stat	Sig
1	Control	0.448	0.448		
2	32% Effluent	0.469	0.469	-1.226	
3	42% Effluent	0.483	0.483	-2.063	
4	56% Effluent	0.471	0.471	-1.356	
5	75% Effluent	0.475	0.475	-1.615	
6	100% Effluent	0.460	0.460	-0.696	

Dunnett table value = 2.36 (1 Tailed Value, P=0.05, DF=24,5)

No statistically significant difference

Shapiro - Wilk's Test For Normality

D = 0.017

W = 0.937

Critical W (P = $0.05$ ) (n = $30$ ) = $0.927$	
Critical W (P = $0.01$ ) (n = $30$ ) = $0.900$	_
Data Pass normality test at P=0.01 level. Continue analysis.	

Bartlett's Test For Homogeneity of Variance

Calculated B1 statistic = 3.07

Table Chi-square value = 15.09 (alpha = 0.01, DF = 5) Table Chi-square value = 11.07 (alpha = 0.05, DF = 5)

Data Pass B1 homogeneity test at 0.01 level. Continue analysis.

Dunnett's Test - Table 1 of 2 Ho:Control < Treatment

<u>Grp</u>	Identification	Num of Reps	Minimum Sig Diff (In Orig. Units)	% of Control	Difference from Control
1	Control	5			
2	32% Effluent	5	0.040	8.9	-0.021
3	42% Effluent	5	0.040	8.9	-0.035
4	56% Effluent	5	0.040	8.9	-0.023
5	75% Effluent	5	0.040	8.9	-0.027
6	100% Effluent	5	0.040	8.9	-0.012

APPENDIX A RAW DATA

#### 7-DAY CERIODAPHNIA DUBIA SURVIVAL & REPRODUCTION DAILY RAW DATA TABLE PAGE \_ | OF \_ 2\_

Forrest City **CLIENT OUTFALL** 001 22899 LAB ID#

START DATE/TIME **END DATE/TIME** 

32

ZG

1409

1440

Rep1 Rep2 Rep3 Rep4 Rep5 Rep6 Rep7 Rep8 Rep9 Rep10

A A A A A A A A A A A A A

Con

			_	-	$\sim$							
Date	Repl	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
0/,	A	A	A	A	A	A	A	4	A	A		, –
<u>  ''                                  </u>		<u> </u>									26	1400
10/2	A	A	4	R	A	8	A	A	A	A	1/7	
12	L										NL	1440
10%	A	A	A	A	A	A	A	A	A	14		
/3											MH	1140
1%	3	A	1	A	4	7	A	4	2	A		
14											NL	1345
10/_	A	3	2	3	A	A	3	A	A	3		
/5											70	1020
10/	6	6	10	9	9	7	8	8	7	6		
16											MH	1000
10/	12	12	13	13	13	/2	//	13	12	11		14.00
17	21	21	25	25	26	22	22	25	21	20	hr	1400
							~					
	- ,, ,		,	ъ.,	. •	7.2	.6	_		0	1.105	)

 $\bar{x}$  # Young w/o Dead =

 $\bar{x}$  # Young w/Dead =

CV%=

100.0  $\bar{x}$  % Survival =

cv%= () . () ()

17/3					1				1	7	MH	1140
12/4	3	2	3	3	A	2	3	2	Ч	A	N	13/2
16/5	A	A	A	A	4	8	A	4	4	प	7.0	
	-	172	0	<u> </u>		<b> </b>	_	ļ.,	ļ.,	_	76	1620
1%	Ľ	10	X	9		A	7	11	Ш.	8	MH	1000
1%	经	13	11 22	12	13 28	14 24	133	13 26	12	12	NL	
	_	Youn Your				247	5		CV%		3,22	
	. 3	₹% S	urvi	val =	/	00	O.0	' (	CV%	= 0	.00	
			******			56						
Date	Repl	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
10/	A	A		A		A	A	A	A	A		

Date	Repl	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
10/	A	A	A	A	A	A	A	A	A	4	7,	147
	<b> </b>	<u> </u>				<u> </u>					26	1400
1%	A	A	A	A	A	Α	Α.	A	·A	Δ	NL	1440
		Λ	7	7	71	70	7	7	7	7	70 -	///-
10/3	1	17	7	#	7	17	1	7	1	4	MH	1140
10)	3	1	A	A	A	A	प	A	3	A	7 (7)	1170
'Ψ											NL	1345
101	A	4	3	3	2	3	A	3	A	4		
/5											26	1020
10/	6	8	11	6	7	6	9	10	9	9		
/6											MH	1000
19	12	11	13	14	12	//	13	15	12	12	, ]	
7	21	23]	27	23	211	20	26	28	24	25	NC	1400
						20	^				- 1	1

42

 $\bar{x}$  # Young w/o Dead = 23.8 CV% = 11.34

 $\bar{x}$  # Young w/Dead = CV%=

0.00  $\bar{x}$  % Survival = 160.0 CV% =

Date	Repl	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
10/	A	A	A	A	A	A	^	A	ᄼ	A		
,	<u> </u>										26	1400
18/2	A	1	A	A	A	A	⋪	A	A	<b>A</b>	41.	100
											NC	1440
193	A	4	A	#	#	1	4	1	4	4		
			$\overline{}$			A					MH	1140
194	ک ا	4	/+	۶	4	4	_ ک	4	4	_3_	10	لما
<del></del>	<u> </u>	•							_		700	בצנה
1%	A	4	4	5		<u>.</u> S	24	14	3	A	7/	
1	┝┯┤			_		-25	_	ᆛ	_	_	26	1020
1%	$\vdash x \vdash$	-44	_0	-74	6	X	7	7	10	_&_	0011	1000
		· L .	<del>-</del>	_	40	7,			<del>-</del>		MH	1000
10/	12	4	<del>/</del> 쉬	/3	<i>[</i> 2]	17	<del>/</del> 2	(2)	/3	<i>[</i> 2]	. 17	10.
11	رکھ	ay	00	<u> </u>	24	21	27	25	26	23	NL	1400

 $\bar{x}$  # Young w/o Dead = 24.6 CV% = 9.62

 $\bar{x}$  # Young w/Dead =

 $\overline{x}$  % Survival = /00.0 CV% = 0.00

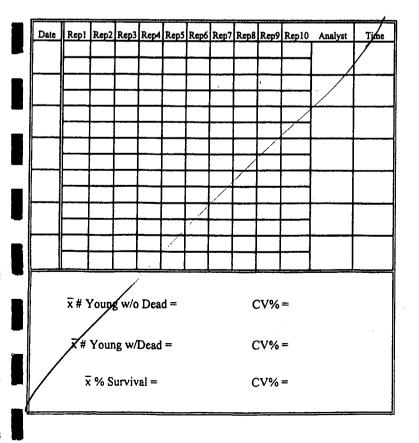
### 7-DAY CERIODAPHNIA DUBIA SURVIVAL & REPRODUCTION DAILY RAW DATA TABLE

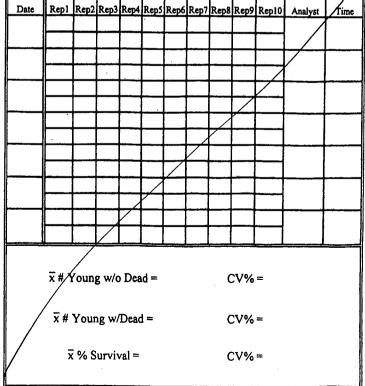
PAGE 2 OF 2

CL	CLIENT Forrest City											
OUTFALL 00/											-	
LAB ID# 22899												_
,	75											
Date	Repl	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
16/,	A	A	A	A	Α	A	A	A		a	26	1400
10/2	Α	Α	A	Ą	A	A	Λ	A	A	A	NL	1440
1%	Æ	A	A	A	4	A	A	A	A	A	MH-	1140
1%	J	4	٦	2	3	A	4	3	3	Æ		1345
10/5	A	4	A	4	A	2	A	4	A	Ч.		1020
1%	8	10	۵	7	6	8	8	G	9	6	МН	1000
19	12 23	13/27	22	13 22	12 21	14 23	与	13	12 24	12	NC	1400
x # Young w/o Dead = 23.5 CV% = 9.25												
x # Young w/Dead = CV% =												
	$\overline{x}$ % Survival = $////$ CV% = $////$											

START DATE/TIME	7-30-14	1 NL	_/4∞
END DATE/TIME	10-7-14	NL	1400

100 Rep1 Rep2 Rep3 Rep4 Rep5 Rep6 Rep7 Rep8 Rep9 Rep10 Analyst AAAAAAAA 10/, 26 1400 1% 140 NC MH 1140 AA43A5A 20 V020 MH 1000 14 121214 1312 NL 1900 23/26/22/27/21/20/26/24/26  $\bar{x}$  # Young w/o Dead = 23  $\omega$  CV% = 10.79  $\bar{x}$  # Young w/Dead = CV%=  $\bar{x}$  % Survival =  $/00.0^{\circ}$  CV% =  $0.00^{\circ}$ 





# 7-DAY CHRONIC TOXICITY TEST PIMEPHALES PROMELAS (fathead minnow) SURVIVAL

 CLIENT/FACILITY
 Forrest City
 DATE/TIME STARTED
 9-30-14 wiß
 1 450

 OUTFALL#
 001 PROJECT # 22899
 DATE/TIME ENDED 10-7-14 wiß
 1430

 ORGANISM ID#
 \$\rmathrm{\rmathrm{Plo-14-272}}\$
 PROJECT # 22899
 DATE/TIME ENDED 10-7-14 wiß
 1430

Conc.	_	В	С	D	E	Ā	В	C									<del></del>			<del></del>		Ī	T	ī —	<del>-</del>
									D	E	<u> </u>	B	l C	_0_	E		В	С	D	E	A	В	С	D	E
Con	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
32	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	S	8	8	8
42	8	8	8	8	8	8	8	8	8	8	8	8	80	જ	8	8	8	8	8	8	8	8	8	8	8
56	8	8	8	8	8	8	8	8	8	8	8	દ	8	80	တ	8	8	8	Я	8	8	8	٥ ۶	8	8
75	8	8	8	8	8	8	8	8	8	8	8	8	જ	8	8	8	8	8	8	8	Ŕ	۶		C	8
100	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
																							-3-		
Initials Date/Time	[0-]	-/4	MН	14	150	10-2	-14	мн	08	\$10	10-3	-14	weß	083	5	10-4	74	NL	082	O	<i>1</i> 0.5	14	26	0	903

Conc.	4	В	c	D	E	А	В	С	D	E	Mean Survival	
Con	8	8	8	8	8	8	8	8	8	8	100	C.V.%
32	8	8	8	8	8	8	8	8	8	&	100	0.00
42	8	8	8	8	8	8	8	Q	8	8	100	$\alpha$
56	8	8	8.	8	8	8	8	8	8	8	100	0.00
75	8	8	8	8	8	8	8	8	8	8		0.00
100	8	8	8	8	8	8	8	8	8	8	100	
												0.00
Initials Date/Time	10-6	5-14	wiß	082	5	10-7-0	4 WZ	B 14	Sa			

# 7-DAY CHRONIC TOXICITY TEST PIMEPHALES PROMELAS (fathead minnow) MEAN WEIGHT/REP

Client	Forrest Cit	Date/Time Start	9/20/14	1450
Project#*	22899	Date/Time End	10/7/14	1450

% Effluent	Rep A	Rep B	Rep.C	Rep D	Rep E	×	Ç.V.%	Analyst
Ca	14820	טעני.	.4170	.4860	.4290	4478	745	BH
٠. ندر	14450	17760	15010	14460	סנדני	.4686	5.02	
42	.4780	15030	14650	14760	14920	.4828	3.07	
56	14560	15020	.4450	14690	14820	4708	4.73	
75	15040	14460	14710	.4520	15030	.4752	5.77	
100	.4160	14490	15020	.4860	, 7450	.45910	7.48	
	·							

Client / Facility _	Forrest City	
Lab ID Number _	22899	
Outfall Number _	001	
Test Date	9-30-14	

#### INITIAL CHEMISTRY MEASUREMENTS @ 100% EFFLUENT

Date	Samp. No.	рН	ĐΟ	Hardness mg/L CaC03 <sup>1</sup>	Alkalinity mg/L CaCO3 <sup>1</sup>	Conduct. umhos/cm <sup>1</sup>	Resid Cl2 mg/L 1	Dechlor(mL) Na282O3 mg/L <sup>1</sup>	Analyst
9/30	1	7.92	8.50	วาล	252	843	(0.01	2	TN
10/2	a	8.04	8.85	280	228	838			
10/4	3	8.04	887	380	<i>a</i> 6a	837			
9/30	Carl	8.25	8.00	100	96	383			

#### INITIAL CHEMISTRY MEASUREMENTS @ RECEIVING WATER

Date	Samp. No.	рНэ	DO.,	Hardness mg/L CaC03 <sup>1</sup>	Alkatinity mg/L CaCO3 1	Conduct. umhos/cm <sup>1</sup>	Resid Cl2 mg/L 1	Dechlor(mL) Na2S2O3 mg/L 1	Analyst
								·	

Notes:				
			***************************************	·

APPENDIX B
REFERENCE TOXICANTS

#### CHRONIC REFERENCE TOXICANT TEST RESULTS

SPECIES: Ceriodaphnia dubia

CHEMICAL: Sodium Chloride

DURATION: 7-Days

TEST NUMBER: 09

TEST DATE/TIME: 09/02/14 - 09/09/14

1315 Hrs - 1315 Hrs

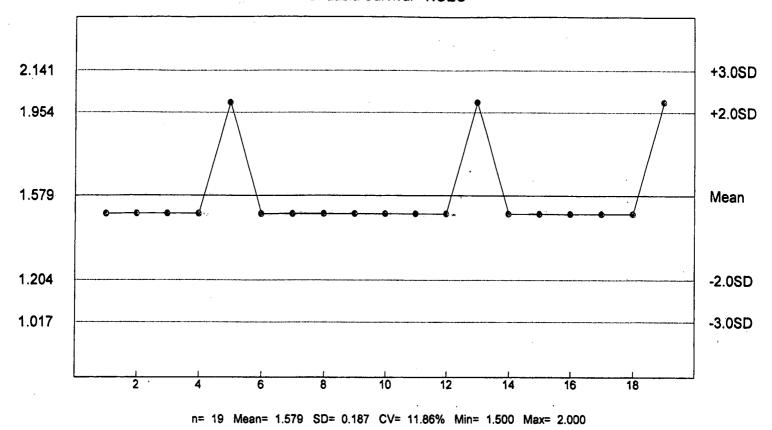
STATISTICAL METHOD: Fishers, Dunnetts/Steels

CONCENTRATION (g/L)	NUMBER EXPOSED	NUMBER DEAD
0.5	10	0
1.0	10	0
1.5	10	0
2.0	10	1
2.5	10	10
3.0	10	10
4.0	10	10

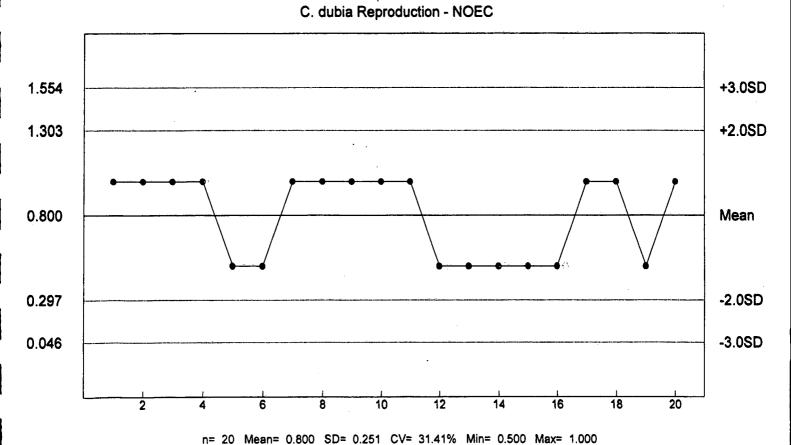
LOEC FOR SURVIVAL	NOEC FOR SURVIVAL	LOEC FOR REPRODUCTION	NOEC FOR REPRODUCTION
2.5 g/L	2.0 g/L	1.5 g/L	1.5 g/L

### Reference Tox Sodium Chloride g/L

#### C. dubia Survival - NOEC



### Reference Tox Sodium Cloride g/L



#### CHRONIC REFERENCE TOXICANT TEST RESULTS

SPECIES: Pimephales promelas

CHEMICAL: Copper Nitrate

DURATION: 7-Days

TEST NUMBER: 09

TEST DATE/TIME: 09/02/14 - 09/09/14

1600 Hrs - 1600 Hrs

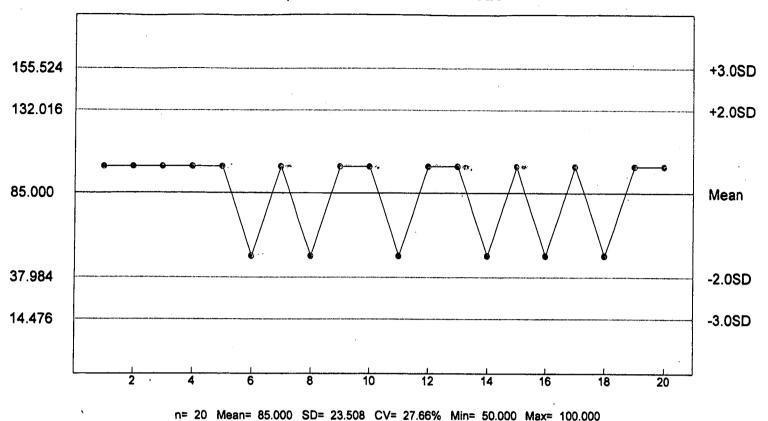
STATISTICAL METHOD: Dunnetts/Steels

CONCENTRATION (ug/L)	NUMBER EXPOSED	NUMBER DEAD
12.5	40	0
25	40	0
50	40	3
100	40	5
200	40	19
400	40	40
800	40	40

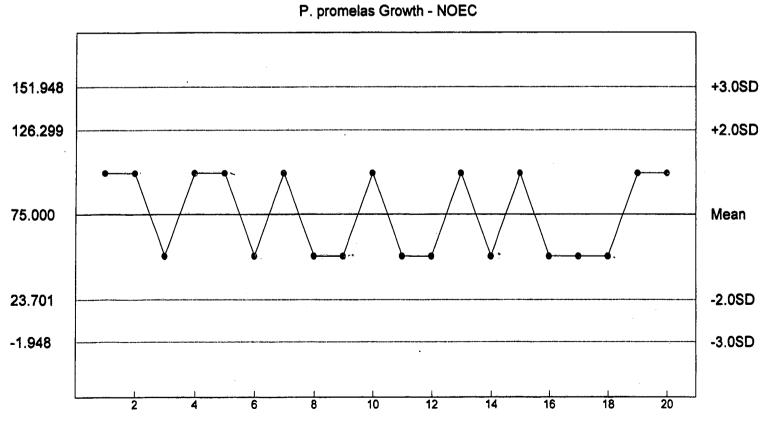
LOBC FOR	NOEC FOR	LOEC FOR	NOEC FOR
SURVIVAL	SURVIVAL	GROWTH	GROWTH
200 ug/L	100 ug/L	200 ug/L	100 ug/L

#### Reference Tox Copper Nitrate ug/L

#### P. promelas Chronic Survival - NOEC



# Reference Tox Copper Nitrate ug/L



n= 20 Mean= 75.000 SD= 25.649 CV= 34.20% Min= 50.000 Max= 100.000

APPENDIX C
CHAIN OF CUSTODY SHEETS

HUTHER & ASSOCIATES 1156 NORTH BONNIE BRAE STREET DENTON, TX 76201 (940) 387-1025 • FAX (940) 387-1036

### **CHAIN OF CUSTODY RECORD**

•	FAX (940) 387-1036							
PROJECT #	22899	PROJECT N	JAME_FO	orrest (	ity	PERN	AIT# <u>NPDES</u>	Alooscor
				OUTFALL SA	MPLES			
		24-H	r Flow Weighted C	omposite(	Other	<del></del>		
								· •
OUTFALL	PERSON TAKING	START	END	# OF PORTIONS	*	COLLECTION AND C	A 5 7 4 5 7	# OF CONTAINERS
NUMBER	SAMPLE	DATE/TIME	END DATE/TIME	COMPOSITED	AUTO COLL. AUTO COMP.	MANUAL COLL. MANUAL COMP.	AUTO COLL. MANUAL COMP.	TO BE SHIPPED
100	Joe   R. Therford	9-28-14 10:00AM	9-29-14 10:00 Am	220				1
				·				
<u> </u>							`	
SAMPLE IDENT	FIGATION (FOR REC'N	The state of the s	VATER SAMPL	ES ATE TIME	# OF CONTAINERS	77737	PE OF TEST	Chil CLE
H,O GRABS, GIV LOCATION	VE NAME OF STREAM A	ND SAMPLE			TO BE SHIPPED			1
						RECEIV	ING WATER (JINY	emod trib.
						DILUTION W FOR	ATER USED C	<u>lb</u>
RELINQUISHED B	Y: Sel R A	ufud	DATE: <u>9-2</u>	29-14 TIME: 1	0:404~ RECEIVED BY	Y AT THIS DATE/TIME _		
RELINQUISHED B	Y:		DATE:	TIME:	RECEIVED BY	Y AT THIS DATE/TIME _		
RELINQUISHED B	Y:		DATE:	TIME:	RECEIVED BY	Y AT THIS DATE/TIME _		
METHOD OF SHIP	MENT: Greyhound	X	Pick Up	C	lient Delivered	Other		
RECEIVED:	Mat yo	mer	1ST PAGE - LAE		O-/4 TIME: /	055 SAMPLE	TEMP. @ RECEIPT	-1,1

HUTHER & ASSOCIATES 1156 NORTH BONNIE BRAE STREET DENTON, TX 76201 (940) 387-1025 • FAX (940) 387-1036

### CHAIN OF CUSTODY RECORD

(940) 387-1025 • F	FAX (940) 387-1036							
PROJECT #	22899	PROJECT N	AMEFC	xrest C	Ly	PERM	IIT# <u>UPDES</u>	AL002008-
				OUTFALL SA	/ MPLES			
		24-Hı	r Flow Weighted C	Composite	Other			
					METHODS OF	COLLECTION AND C	OMPOSITE	ì
OUTFALL , NUMBER	PERSON TAKING	START DATE/TIME	END DATE/TIME	# OF PORTIONS = COMPOSITED	AUTO COLL. AUTO COMP.	MANUAL COLL MANUAL COMP	AUTO COLL MANUAL COMP.	# OF CONTAINERS TO BE SHIPPED
001	Joe I R. Therford	9-30-14 10100AM	10-1-14 10:00Am	231				1
	I	RECEIVING W	VATER SAMPI	LES				
H,O GRABS, GIV	FICATION (FOR REC'! E NAME OF STREAM	NG) PERSON TAI	KING . I	DATE. TIME	# OF CONTAINERS. TO BE SHIPPED	TY	PE OF TEST	by CF
LÓCATION						RECEIV	NAME OF UNITED ING WATER	iomed frip
						DILUTION W FOR	ATER USED	<b>a</b> b
	0 0 0 4							
RELINQUISHED BY	i: <b>Gel K. H</b>	aprid	DATE: 10	•}-14 TIME: ∐	1:00A PRECEIVED B	Y AT THIS DATE/TIME _		
RELINQUISHED BY			DATE:		RECEIVED B		· · · · · · · · · · · · · · · · · · ·	
RELINQUISHED BY		· ×			RECEIVED BY			
METHOD OF SHIPM	MENT: Greyhound	4 0 .	Pick Up		Client Delivered	Other_		
RECEIVED:	TIVAM 10	mer	1ST PAGE - LA		2 -/4 TIME:	1025 SAMPLE	TEMP. @ RECEIPT.	-0.9

HUTHER & ASSOCIATES 1156 NORTH BONNIE BRAE STREET DENTON, TX 76201 (940) 387-1025 • FAX (940) 387-1036

### CHAIN OF CUSTODY RECORD

(940) 387-1025 • F	FAX (940) 387-1036							
PROJECT #	20899	PROJECT N	NAME FO	rrest Cit	-1	PERM	AIT# NPDES	AR000008
				OUTFALL SA	MPLES			
		24-Н	r Flow Weighted (	Composite(	Other			
					METHODS OF	COLLECTION AND C	OMPOSITE	
OUTFALL NUMBER	PERSON TAKING SAMPLE	START DATE/TIME	END DATE/TIME	# OF PORTIONS COMPOSITED	AUTO COLL AUTO COMP.	MANUAL COLL. MANUAL COMP.	AUTO COLL. MANUAL COMP.	# OF CONTAINERS TO BE SHIPPED
001	Joel R. Thetford	10-2-14 10:00Am	10-3-14 10:00 An	137				1
			<u></u>					
GANGER TO THE	FICATION (FOR REC')	-	VATER SAMPI	Class of Control and Control and West			7	du Cle
H,O GRABS, GIVI LOCATION	E NAME OF STREAM	ND SAMPLE		DATE TIME	# OF CONTAINERS TO BE SHIPPED		NAME OF UNITED ING WATER	named trib
			-			DILUTION W FOI	ATER USED	ah
RELINQUISHED BY		april	DATE: <u>10-</u>	3-14 TIME: 1	:00AMRECEIVED BY	Y AT THIS DATE/TIME _		
RELINQUISHED BY				•	RECEIVED BY			
METHOD OF SHIPM	MENT: Greyhound		Pick Up		lient Delivered	Other		
RECEIVED:	stasla à	ll	1ST PAGE - LA	DATE: 10-4	7/4 TIME: 2ND PAGE - FACILITY COPY	SAMPLE	TEMP. @ RECEIPT	3.6°

environmental toxicologists, biologists, and consultants

# CITY OF FORREST CITY. NPDES PERMIT NO. AR0020087 BIOMONITORING REPORTING. TEST DATE: 09/30/14

I. Ceriodaphnia dubia	Response
a. If the NOEC for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TLP3B.	0
b. Report the NOEC value for survival, Parameter No. TOP3B.	100%
c. Report the NOEC value for reproduction, Parameter No. TPP3B.	100%
d. If the NOEC for reproduction is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TGP3B.	0
e. Report the higher coefficient of variation (critical dilution or control), Parameter No. TQP3B.	10.79%
II. Pimephales promelas	Response
a. If the No Observed Effect Concentration (NOEC) for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0".  Parameter No. TLP6C.	0
b. Report the NOEC value for survival, Parameter No. TOP6C.	100%
c. Report the NOEC value for growth, Parameter No. TPP6C.	100%
d. If the No Observed Effect Concentration (NOEC) for growth is less than the critical dilution, enter a "1"; otherwise, renter a "0".  Parameter No. TGP6C.	0
e. Report the highest coefficient of variation (critical dilution or control)  Parameter No. TQP6C.	7.48%

Ph: (940) 387-1025 Fax: (940) 387-1036



For 303 N. Hosser Street
Post Office Box 816
Forrest City, AR 72335





Arkansas Department of Environmental Quality 5301 North Shore Drive North Little Rock, AR 72118-5317