

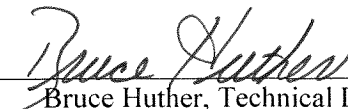
CITY OF ROGERS
OUTFALL 001

Chronic Biomonitoring Report
Permit Number NPDES AR0043397
AFIN 04-00155

Ceriodaphnia dubia
Pimephales promelas

June 21, 2022

Reviewed by:


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TOXICITY TEST REPORT - CHRONIC

Client City of Rogers Laboratory I.D. 34040
Permit No. NPDES AR0043397 Begin Date June 21, 2022
Sample.....Outfall 001

Results: Pass Ceriodaphnia dubia survival and reproduction and Pimephales promelas survival and growth at the critical concentration (82% effluent).

SAMPLE COLLECTION

Composite effluent samples from City of Rogers were delivered by Federal Express courier to Huther & Associates on June 21, June 23, and June 25, 2022. Effluent samples were collected and composited from Outfall 001 using an automatic sampler by facility personnel. 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, 23rd 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 1435 hours, June 21, 2022. Five concentrations were prepared (26%, 35%, 46%, 62% and 82% effluent) utilizing distilled, deionized laboratory water reconstituted to match the hardness, alkalinity and pH of the receiving stream (Osage Creek). 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.

A control of ten 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 1435 hours, June 28, 2022. Survival and reproduction 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).

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: 82% Effluent

REPRODUCTION
Ceriodaphnia dubia

C. dubia reproduction data were normally distributed at the 0.01 alpha level (13.277) using Chi-Square test for normality. Reproduction 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 *C. dubia* reproduction data demonstrated that there were no statistically significant differences between the control and any of the effluent concentrations.

LOEC: Not Applicable **PMSD: 10.5%**
NOEC: 82% Effluent

TEST SETUP
Pimephales promelas



The seven-day *Pimephales promelas* larval survival and growth test was initiated at 1450 hours, June 21, 2022. Five concentrations were prepared (26%, 35%, 46%, 62% and 82% effluent) utilizing distilled, deionized laboratory water reconstituted to match the hardness, alkalinity and pH of the receiving stream (Osage Creek). The test was conducted in 300 mL distilled water rinsed plastic beakers containing 250 mL of solution (eight organisms 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 beakers 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, June 28, 2022. 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).

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: 82% Effluent

GROWTH
Pimephales promelas

P. promelas growth data failed Shapiro Wilk's test for normality at the 0.01 alpha level (0.900). Bartlett's test for homogeneity is sensitive to non-normal 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 *P. promelas* growth data demonstrated that there were no statistically significant differences between the control and any of the effluent concentrations.

LOEC: Not Applicable **PMSD: 7.7%**
NOEC: 82% Effluent

SUMMARY

There were no statistically significant differences between the control and the critical low flow concentration (82% 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 AR0043397 for City of Rogers, Outfall 001 **passed** for this testing period.

Huthur and Associates

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

CLIENT City of Rogers
 NPDES # AR0043397
 LAB ID # 34040
 TEST TYPE 7 Day Chronic
 TEST ORGANISM *Ceriodaphnia dubia*
 ORGANISM AGE < 24-Hours
 ORGANISM SOURCE In House
 RECEIVING WATER Osage Creek
 DILUTION WATER Laboratory

SAMPLE TYPE 24 Hour Composite
 DATE COLLECTED 06/20/22 06/22/22 06/24/22
 DATE RECEIVED 06/21/22 06/23/22 06/25/22
 BEGIN DATE/TIME 06/21/22 1435
 END DATE/TIME 06/28/22 1435
 TEST TEMPERATURE (°C) 25 ± 1
 PHOTO PERIOD 16-hr. Light 8-hr. Dark
 LIGHT INTENSITY 50-100 ft. cndl.
 TECHNICIAN T. Geiger

SURVIVAL & REPRODUCTION SUMMARY

Control

Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
06/22/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
06/23/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
06/24/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
	4	2	2	4	5	3	5	3	3	2
06/25/22	4	2	2	4	5	3	5	3	3	2
	A	A	A	A	A	A	A	A	A	A
06/26/22	4	2	2	4	5	3	5	3	3	2
	6	9	8	11	6	8	6	7	11	7
06/27/22	10	11	10	15	11	11	11	10	14	9
	14	12	13	13	14	12	13	13	14	13
06/28/22	24	23	23	28	25	23	24	23	28	22
x # Young 24.3 C.V. 8.69% x%Survival 100% C.V. 0.00%										

26%Effluent

Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
06/22/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
06/23/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
06/24/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
	2	5	3	5	4	2	3	4	2	3
06/25/22	2	5	3	5	4	2	3	4	2	3
	A	A	A	A	A	A	A	A	A	A
06/26/22	2	5	3	5	4	2	3	4	2	3
	8	11	7	10	6	10	8	7	7	6
06/27/22	10	16	10	15	10	12	11	11	9	9
	13	12	14	13	14	13	12	12	13	12
06/28/22	23	28	24	28	24	25	23	23	22	21
x # Young 24.1 C.V. 9.67% x%Survival 100% C.V. 0.00%										

35%Effluent

Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
06/22/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
06/23/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
06/24/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
	3	2	5	2	3	3	3	4	5	2
06/25/22	3	2	5	2	3	3	3	4	5	2
	A	A	A	A	A	A	A	A	A	A
06/26/22	3	2	5	2	3	3	3	4	5	2
	6	6	6	8	11	6	11	7	11	6
06/27/22	9	8	11	10	14	9	14	11	16	8
	13	12	12	14	13	13	13	14	12	12
06/28/22	22	20	23	24	27	22	27	25	28	20
x # Young 23.8 C.V. 12.18% x%Survival 100% C.V. 0.00%										

46%Effluent

Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
06/22/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
06/23/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
06/24/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
	5	2	3	2	4	3	5	2	2	3
06/25/22	5	2	3	2	4	3	5	2	2	3
	A	A	A	A	A	A	A	A	A	A
06/26/22	5	2	3	2	4	3	5	2	2	3
	6	6	9	7	11	9	10	9	10	10
06/27/22	11	8	12	9	15	12	15	11	12	13
	13	14	12	14	13	13	12	13	14	12
06/28/22	24	22	24	23	28	25	27	24	26	25
x # Young 24.8 C.V. 7.31% x%Survival 100% C.V. 0.00%										

where: A = Alive
 5 = Alive, 5 young
 D = Dead
 D5 = 5 Young, Female died

ex 1:

A
4

 alive today
 total young to date

ex 2:

5
12

 alive, 5 young today
 total young to date

Huthner and Associates
7-Day/3 Brood *Ceriodaphnia dubia* Survival and Reproduction Chronic Toxicity Test

Rogers

Lab ID# 34040

Test Date: June 21, 2022

62% Effluent														
Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10				
06/22/22	A	A	A	A	A	A	A	A	A	A				
	0	0	0	0	0	0	0	0	0	0				
06/23/22	A	A	A	A	A	A	A	A	A	A				
	0	0	0	0	0	0	0	0	0	0				
06/24/22	A	A	A	A	A	A	A	A	A	A				
	0	0	0	0	0	0	0	0	0	0				
06/25/22	2	2	3	5	2	3	4	3	2	3				
	2	2	3	5	2	3	4	3	2	3				
06/26/22	A	A	A	A	A	A	A	A	A	A				
	2	2	3	5	2	3	4	3	2	3				
06/27/22	7	6	9	8	6	9	11	11	10	9				
	9	8	12	13	8	12	15	14	12	12				
06/28/22	13	14	12	12	13	14	13	13	14	12				
	22	22	24	25	21	26	28	27	26	24				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">x # Young 24.5</td> <td style="width: 50%;">C.V. 9.48%</td> </tr> <tr> <td>x%Survival 100%</td> <td>C.V. 0.00%</td> </tr> </table>											x # Young 24.5	C.V. 9.48%	x%Survival 100%	C.V. 0.00%
x # Young 24.5	C.V. 9.48%													
x%Survival 100%	C.V. 0.00%													

82% Effluent														
Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10				
06/22/22	A	A	A	A	A	A	A	A	A	A				
	0	0	0	0	0	0	0	0	0	0				
06/23/22	A	A	A	A	A	A	A	A	A	A				
	0	0	0	0	0	0	0	0	0	0				
06/24/22	A	A	A	A	A	A	A	A	A	A				
	0	0	0	0	0	0	0	0	0	0				
06/25/22	4	2	2	3	5	2	3	5	3	4				
	4	2	2	3	5	2	3	5	3	4				
06/26/22	A	A	A	A	A	A	A	A	A	A				
	4	2	2	3	5	2	3	5	3	4				
06/27/22	10	6	9	6	11	6	7	11	6	11				
	14	8	11	9	16	8	10	16	9	15				
06/28/22	12	14	13	14	13	13	12	12	13	14				
	26	22	24	23	29	21	22	28	22	29				
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%;">x # Young 24.6</td> <td style="width: 50%;">C.V. 12.74%</td> </tr> <tr> <td>x%Survival 100%</td> <td>C.V. 0.00%</td> </tr> </table>											x # Young 24.6	C.V. 12.74%	x%Survival 100%	C.V. 0.00%
x # Young 24.6	C.V. 12.74%													
x%Survival 100%	C.V. 0.00%													

where: A = Alive
5 = Alive, 5 young
D = Dead
D5 = 5 Young, Female died

ex 1:

A
4

 alive today
total young to date

ex 2:

5
12

 alive, 5 young today
total young to date

Huthner and Associates
7-Day/3 Brood *Ceriodaphnia dubia* Survival and Reproduction Chronic Toxicity Test

Rogers

Lab ID# 34040

Test Date: June 21, 2022

WET CHEMISTRY MEASUREMENTS

Date	Time	Temp	Samp. No.	pH of Solution						Analyst
				CON	26%	35%	46%	62%	82%	
06/21/22	Start	25.0	1	8.35	8.19	8.07	8.01	7.92	7.81	AE
06/22/22	24 Hr.	23.9	1	8.41	8.41	8.42	8.39	8.39	8.39	AE
06/22/22	Renew	25.0	1	7.97	7.96	7.95	8.00	8.02	7.98	AE
06/23/22	48 Hr.	23.8	1	8.73	8.60	8.55	8.50	8.48	8.45	ID
06/23/22	Renew	25.0	2	7.78	7.90	7.90	7.88	7.88	7.85	AE
06/24/22	72 Hr.	24.0	2	8.72	8.59	8.61	8.56	8.53	8.46	ID
06/24/22	Renew	25.0	2	8.23	8.10	8.02	8.00	7.96	7.88	ID
06/25/22	96 Hr.	24.0	2	8.63	8.54	8.64	8.57	8.51	8.37	JC
06/25/22	Renew	25.0	3	8.19	8.07	7.98	7.91	7.89	7.81	ID
06/26/22	120 Hr.	23.9	3	8.45	8.38	8.32	8.31	8.33	8.30	HB
06/26/22	Renew	25.0	3	8.50	8.46	8.37	8.30	8.25	8.20	HB
06/27/22	144 Hr.	24.0	3	8.72	8.63	8.62	8.60	8.57	8.47	AE
06/27/22	Renew	25.0	3	8.39	8.21	8.09	8.25	8.14	8.11	HB
06/28/22	168 Hr.	23.9	3	8.84	8.72	8.67	8.63	8.59	8.55	AE

Date	Time	Temp	Samp. No.	DO (mg/L) of Solution						Analyst
				CON	26%	35%	46%	62%	82%	
06/21/22	Start	25.0	1	7.80	7.99	8.20	8.58	8.57	7.77	AE
06/22/22	24 Hr.	23.9	1	8.41	8.09	8.53	8.47	7.76	8.52	AE
06/22/22	Renew	25.0	1	8.06	7.72	8.41	7.82	7.84	7.86	AE
06/23/22	48 Hr.	23.8	1	7.50	7.79	8.15	7.96	7.72	7.64	ID
06/23/22	Renew	25.0	2	7.38	8.16	8.38	8.56	8.64	8.46	AE
06/24/22	72 Hr.	24.0	2	8.24	7.91	7.73	7.85	7.52	7.47	ID
06/24/22	Renew	25.0	2	7.05	7.80	7.42	7.67	7.36	7.28	ID
06/25/22	96 Hr.	24.0	2	7.12	7.18	7.72	7.02	7.73	7.67	JC
06/25/22	Renew	25.0	3	7.38	8.32	7.90	8.08	7.41	7.55	ID
06/26/22	120 Hr.	23.9	3	7.18	7.64	7.07	7.16	7.26	7.30	HB
06/26/22	Renew	25.0	3	7.27	7.38	7.89	7.34	7.55	7.98	HB
06/27/22	144 Hr.	24.0	3	8.32	8.56	8.19	8.20	8.18	8.11	AE
06/27/22	Renew	25.0	3	7.22	7.56	7.46	7.50	7.30	7.47	HB
06/28/22	168 Hr.	23.9	3	7.82	7.97	8.03	8.30	8.24	7.92	AE

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

Rogers

Lab ID# 34040

Test Date: June 21, 2022

INITIAL CHEMISTRY MEASUREMENTS @ 100% EFFLUENT

Date	Samp. No.	pH ¹	DO ¹	Hardness mg/L CaCO ₃ ¹	Alkalinity mg/L CaCO ₃ ¹	Conduct. μS/cm ¹	Resid.Cl ₂ mg/L ¹	Dechlor(mL) Na ₂ S ₂ O ₅ mg/L ¹	Analyst
06/21/22	1	7.63	7.74	112	96	665	<0.01	N/A	AE
06/23/22	2	7.76	8.52	104	88	630	<0.01	N/A	AE
06/25/22	3	7.86	7.72	108	90	683	<0.01	N/A	ID
06/21/22	CON	8.35	7.80	124	93	512	-	N/A	AE

¹ Measurements taken in 100% solution.

CERIODAPHNIA DUBIA STATISTICAL ANALYSES
 Reproduction

Summary Statistics on Transformed Data Table 1 of 2

Grp	Identification	N	Min	Max	Mean
1	Control	10	22.000	28.000	24.300
2	26% Effluent	10	21.000	28.000	24.100
3	35% Effluent	10	20.000	28.000	23.800
4	46% Effluent	10	22.000	28.000	24.800
5	62% Effluent	10	21.000	28.000	24.500
6	82% Effluent	10	21.000	29.000	24.600

Summary Statistics on Transformed Data Table 2 of 2

Grp	Identification	Variance	Sd	Sem	C.V.%
1	Control	4.456	2.111	0.667	8.69
2	26% Effluent	5.433	2.331	0.737	9.67
3	35% Effluent	8.400	2.898	0.917	12.18
4	46% Effluent	3.289	1.814	0.573	7.31
5	62% Effluent	5.389	2.321	0.734	9.48
6	82% Effluent	9.822	3.134	0.991	12.74

Chi-Square Test For Normality: Actual And Expected Frequencies

Interval	< -1.5	-1.5 to -0.5	-0.5 to 0.5	>0.5 to 1.5	>1.5
Expected	4.020	14.520	22.920	14.520	4.020
Observed	2	19	22	11	6

Calculated Chi-Square goodness of fit test statistic = 4.2628
 Table Chi-Square value (alpha = 0.01) = 13.277

Data **Pass** normality test. Continue analysis.

Bartlett's Test For Homogeneity of Variance

Calculated B1 statistic = 3.50

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.

ANOVA Table

SOURCE	DF	SS	MS	F
Between	5	6.550	1.310	0.214
Within (Error)	54	331.100	6.131	
Total	59	337.650		

Critical F value = 2.45 (0.05,5,40)

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

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

Grp	Identification	Transformed	Mean	T Stat	Sig
		Mean	Calculated In Original Units		
1	Control	24.300	24.300		
2	26% Effluent	24.100	24.100	0.181	
3	35% Effluent	23.800	23.800	0.452	
4	46% Effluent	24.800	24.800	-0.452	
5	62% Effluent	24.500	24.500	-0.181	
6	82% Effluent	24.600	24.600	-0.271	

Dunnett table value = 2.31 (1 Tailed Value, P=0.05, DF=40,5)

No statistically significant difference

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

Grp	Identification	Num of Reps	Minimum	Sig	% of Control	Difference from Control
			Diff (In Orig. Units)	Diff		
1	Control	10				
2	26% Effluent	10	2.558	10.5	0.200	
3	35% Effluent	10	2.558	10.5	0.500	
4	46% Effluent	10	2.558	10.5	-0.500	
5	62% Effluent	10	2.558	10.5	-0.200	
6	82% Effluent	10	2.558	10.5	-0.300	

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

CLIENT	City of Rogers	SAMPLE TYPE	24 Hour Composite
NPDES #	AR0043397	DATE COLLECTED	06/20/22 06/22/22 06/24/22
LAB ID #	34040	DATE RECEIVED	06/21/22 06/23/22 06/25/22
TEST TYPE	7 Day Chronic	BEGIN DATE/TIME	06/21/22 1450
TEST ORGANISM	<i>Pimephales promelas</i>	END DATE/TIME	06/28/22 1450
ORGANISM AGE	< 24-Hours	TEST TEMPERATURE (°C)	25 ± 1
ORGANISM SOURCE	In House	PHOTO PERIOD	16-hr. Light 8-hr. Dark
RECEIVING WATER	Osage Creek	LIGHT INTENSITY	50-100 ft. candl.
DILUTION WATER	Laboratory	TECHNICIAN	R. Stogner

SURVIVAL SUMMARY

Conc.	06/22/22					06/23/22					06/24/22					06/25/22					06/26/22				
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	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
26%	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
35%	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
46%	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
62%	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
82%	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

Conc.	06/27/22					06/28/22					x% Survival	C.V. %
	A	B	C	D	E	A	B	C	D	E		
CON	8	8	8	8	8	8	8	8	8	8	100.0	0.00
26%	8	8	8	8	8	8	8	8	8	8	100.0	0.00
35%	8	8	8	8	8	8	8	8	8	8	100.0	0.00
46%	8	8	8	8	8	8	8	8	8	8	100.0	0.00
62%	8	8	8	8	8	8	8	8	8	8	100.0	0.00
82%	8	8	8	8	8	8	8	8	8	8	100.0	0.00

MEAN DRY WEIGHT PER REP

% Effluent	Rep A	Rep B	Rep C	Rep D	Rep E	x	C.V.%
CON	0.4640	0.4230	0.4570	0.4330	0.4210	0.4396	4.50
26%	0.4590	0.4810	0.4670	0.4450	0.4620	0.4628	2.82
35%	0.4750	0.4860	0.4210	0.4630	0.4770	0.4644	5.51
46%	0.4680	0.4720	0.4850	0.4760	0.4250	0.4652	5.02
62%	0.4710	0.4880	0.4250	0.4630	0.4890	0.4672	5.58
82%	0.4190	0.4630	0.4850	0.4720	0.4590	0.4596	5.39

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

Rogers

Lab ID# 34040

Test Date: June 21, 2022

WET CHEMISTRY MEASUREMENTS

Date	Time	Temp	Samp. No.	pH of Solution						Analyst
				CON	26%	35%	46%	62%	82%	
06/21/22	Start	25.0	1	8.35	8.19	8.07	8.01	7.92	7.81	AE
06/22/22	24 Hr.	24.4	1	8.78	8.56	8.45	8.40	8.38	8.31	AE
06/22/22	Renew	25.0	1	7.97	7.96	7.95	8.00	8.02	7.98	AE
06/23/22	48 Hr.	24.3	1	8.75	8.45	8.33	8.28	8.25	8.21	AE
06/23/22	Renew	25.0	2	7.78	7.90	7.90	7.88	7.88	7.85	AE
06/24/22	72 Hr.	24.4	2	8.63	8.43	8.38	8.37	8.40	8.36	ID
06/24/22	Renew	25.0	2	8.23	8.10	8.02	8.00	7.96	7.88	ID
06/25/22	96 Hr.	24.2	2	8.66	8.38	8.35	8.27	8.23	8.18	ID
06/25/22	Renew	25.0	3	8.19	8.07	7.98	7.91	7.89	7.81	ID
06/26/22	120 Hr.	24.4	3	8.58	8.43	8.39	8.28	8.27	8.19	HB
06/26/22	Renew	25.0	3	8.50	8.46	8.37	8.30	8.25	8.20	HB
06/27/22	144 Hr.	24.2	3	8.57	8.39	8.31	8.28	8.26	8.17	HB
06/27/22	Renew	25.0	3	8.39	8.21	8.09	8.25	8.14	8.11	HB
06/28/22	168 Hr.	24.2	3	8.60	8.45	8.45	8.39	8.42	8.39	AE

Date	Time	Temp	Samp. No.	DO (mg/L) of Solution						Analyst
				CON	26%	35%	46%	62%	82%	
06/21/22	Start	25.0	1	7.80	7.99	8.20	8.58	8.57	7.77	AE
06/22/22	24 Hr.	24.4	1	8.35	8.38	8.46	8.49	8.56	8.58	AE
06/22/22	Renew	25.0	1	8.06	7.72	8.41	8.82	8.84	8.86	AE
06/23/22	48 Hr.	24.3	1	8.20	7.95	8.44	8.49	8.52	8.00	AE
06/23/22	Renew	25.0	2	7.38	8.16	8.38	8.56	8.64	8.46	AE
06/24/22	72 Hr.	24.4	2	7.70	7.66	7.11	8.30	7.61	7.01	ID
06/24/22	Renew	25.0	2	7.05	7.80	7.42	7.67	7.36	7.28	ID
06/25/22	96 Hr.	24.2	2	8.47	7.20	8.46	7.85	7.99	7.21	ID
06/25/22	Renew	25.0	3	7.38	8.32	7.90	8.08	7.41	7.55	ID
06/26/22	120 Hr.	24.4	3	7.41	7.38	7.77	7.82	7.91	7.99	HB
06/26/22	Renew	25.0	3	7.27	7.38	7.89	7.34	7.55	7.98	HB
06/27/22	144 Hr.	24.2	3	7.39	7.53	7.65	7.80	7.94	7.91	HB
06/27/22	Renew	25.0	3	7.22	7.56	7.46	7.50	7.30	7.47	HB
06/28/22	168 Hr.	24.2	3	7.80	7.84	8.15	8.10	7.92	8.08	AE

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

Rogers

Lab ID# 34040

Test Date: June 21, 2022

INITIAL CHEMISTRY MEASUREMENTS @ 100% EFFLUENT

Date	Samp. No.	pH ¹	DO ¹	Hardness mg/L CaCO ₃ ¹	Alkalinity mg/L CaCO ₃ ¹	Conduct. μS/cm ¹	Resid.Cl ₂ mg/L ¹	Dechlor(mL) Na ₂ S ₂ O ₅ mg/L ¹	Analyst
06/21/22	1	7.63	7.74	112	96	665	<0.01	N/A	AE
06/23/22	2	7.76	8.52	104	88	630	<0.01	N/A	AE
06/25/22	3	7.86	7.72	108	90	683	<0.01	N/A	ID
06/21/22	CON	8.35	7.80	124	93	512	-	N/A	AE

¹ Measurements taken in 100% solution.

PIMEPHALES PROMELAS STATISTICAL ANALYSES
 Growth

Summary Statistics on Transformed Data Table 1 of 2

<u>Grp</u>	<u>Identification</u>	<u>N</u>	<u>Min</u>	<u>Max</u>	<u>Mean</u>
1	Control	5	0.421	0.464	0.440
2	26% Effluent	5	0.445	0.481	0.463
3	35% Effluent	5	0.421	0.486	0.464
4	46% Effluent	5	0.425	0.485	0.465
5	62% Effluent	5	0.425	0.489	0.467
6	82% Effluent	5	0.419	0.485	0.460

Summary Statistics on Transformed Data Table 2 of 2

<u>Grp</u>	<u>Identification</u>	<u>Variance</u>	<u>Sd</u>	<u>Sem</u>	<u>C.V.%</u>
1	Control	0.000	0.020	0.009	4.50
2	26% Effluent	0.000	0.013	0.006	2.82
3	35% Effluent	0.001	0.026	0.011	5.51
4	46% Effluent	0.001	0.023	0.010	5.02
5	62% Effluent	0.001	0.026	0.012	5.58
6	82% Effluent	0.001	0.025	0.011	5.39

Shapiro - Wilk's Test For Normality

D = 0.012

W = 0.883

Critical W (P = 0.05) (n = 30) = 0.927

Critical W (P = 0.01) (n = 30) = 0.900

Data **Fail** normality test. Try another transformation.

Warning - The first three homogeneity tests are sensitive to non-normal data and should not be performed.

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

<u>Grp</u>	<u>Identification</u>	<u>Transformed Mean</u>	<u>Rank Sum</u>	<u>Crit. Value</u>	<u>Df</u>	<u>Sig</u>
1	Control	0.440				
2	26% Effluent	0.463	36.00	16.00	5.00	
3	35% Effluent	0.464	34.50	16.00	5.00	
4	46% Effluent	0.465	37.00	16.00	5.00	
5	62% Effluent	0.467	36.00	16.00	5.00	
6	82% Effluent	0.460	33.00	16.00	5.00	

Critical values use k = 5, are 1 tailed, and alpha = 0.05

No statistically significant difference

**APPENDIX A
RAW DATA**

7-DAY CERIODAPHNIA DUBIA SURVIVAL & REPRODUCTION

DAILY RAW DATA TABLE

CLIENT Rogers
 OUTFALL 001
 LAB ID # 34040

START DATE/TIME 6-21-22 TG 1435
 END DATE/TIME 6-28-22 TG 1435

Con

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
6/22	A	A	A	A	A	A	A	A	A	A	TG	1435
6/23	A	A	A	A	A	A	A	A	A	A	MH	1430
6/24	A	A	A	A	A	A	A	A	A	A	JC	1100
6/25	4	2	2	4	5	3	5	3	3	2	TG	1415
6/26	A	A	A	A	A	A	A	A	A	A	TG	1315
6/27	6	9	8	11	6	8	6	7	11	7	MH	1145
6/28	14	12	13	13	14	12	13	13	14	13	TG	1435
	24	23	23	28	25	23	24	23	28	22		

\bar{x} # Young w/o Dead = 24.3 CV% = 8.69
 \bar{x} # Young w/Dead = CV% =
 \bar{x} % Survival = 100 CV% = 0.00

26

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
6/22	A	A	A	A	A	A	A	A	A	A	TG	1435
6/23	A	A	A	A	A	A	A	A	A	A	MH	1430
6/24	A	A	A	A	A	A	A	A	A	A	JC	1100
6/25	2	5	3	5	4	2	3	4	2	3	TG	1415
6/26	A	A	A	A	A	A	A	A	A	A	TG	1315
6/27	8	11	7	10	6	10	8	7	7	6	MH	1145
6/28	13	12	14	13	14	13	12	12	13	12	TG	1435
	23	28	24	28	24	25	23	23	22	21		

\bar{x} # Young w/o Dead = 24.1 CV% = 9.67
 \bar{x} # Young w/Dead = CV% =
 \bar{x} % Survival = 100 CV% = 0.00

35

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
6/22	A	A	A	A	A	A	A	A	A	A	TG	1435
6/23	A	A	A	A	A	A	A	A	A	A	MH	1430
6/24	A	A	A	A	A	A	A	A	A	A	JC	1100
6/25	3	2	5	2	3	3	3	4	5	2	TG	1415
6/26	A	A	A	A	A	A	A	A	A	A	TG	1315
6/27	6	6	6	8	11	6	11	7	11	6	MH	1145
6/28	13	12	12	14	13	13	13	14	12	12	TG	1435
	22	20	23	24	27	22	27	25	28	20		

\bar{x} # Young w/o Dead = 23.8 CV% = 12.18
 \bar{x} # Young w/Dead = CV% =
 \bar{x} % Survival = 100 CV% = 0.00

46

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
6/22	A	A	A	A	A	A	A	A	A	A	TG	1435
6/23	A	A	A	A	A	A	A	A	A	A	MH	1430
6/24	A	A	A	A	A	A	A	A	A	A	JC	1100
6/25	5	2	3	2	4	3	5	2	2	3	TG	1415
6/26	A	A	A	A	A	A	A	A	A	A	TG	1315
6/27	6	6	9	7	11	9	10	9	10	10	MH	1145
6/28	13	14	12	14	13	13	12	13	14	12	TG	1435
	24	22	24	23	28	25	27	24	26	25		

\bar{x} # Young w/o Dead = 24.8 CV% = 7.31
 \bar{x} # Young w/Dead = CV% =
 \bar{x} % Survival = 100 CV% = 0.00

7-DAY CERIODAPHNIA DUBIA SURVIVAL & REPRODUCTION

DAILY RAW DATA TABLE

CLIENT Rogers
 OUTFALL 001
 LAB ID # 34040

START DATE/TIME 6-21-22 TG 1435
 END DATE/TIME 6-28-22 TG 1435

62

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
6/22	A	A	A	A	A	A	A	A	A	A	TG	1435
6/23	A	A	A	A	A	A	A	A	A	A	MH	1430
6/24	A	A	A	A	A	A	A	A	A	A	Jc	1100
6/25	2	2	3	5	2	3	4	3	2	3	TG	1415
6/26	A	A	A	A	A	A	A	A	A	A	TG	1315
6/27	7	6	9	8	6	9	11	11	10	9	MH	1145
6/28	13	14	12	12	13	14	13	13	14	12	TG	1435

\bar{x} # Young w/o Dead = 24.5 CV% = 9.48

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

\bar{x} % Survival = 100 CV% = 0.00

82

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
6/22	A	A	A	A	A	A	A	A	A	A	TG	1435
6/23	A	A	A	A	A	A	A	A	A	A	MH	1430
6/24	A	A	A	A	A	A	A	A	A	A	Jc	1100
6/25	4	2	2	3	5	2	3	5	3	4	TG	1415
6/26	A	A	A	A	A	A	A	A	A	A	TG	1315
6/27	10	6	9	6	11	6	7	11	6	11	MH	1145
6/28	12	14	13	14	13	13	12	12	13	14	TG	1435

\bar{x} # Young w/o Dead = 24.6 CV% = 12.74

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

\bar{x} % Survival = 100 CV% = 0.00

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time

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

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

\bar{x} % Survival = CV% =

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time

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

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

\bar{x} % Survival = CV% =

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

CLIENT/FACILITY: Rogers DATE/TIME STARTED: 6/21/22 RS 1450
 OUTFALL #: 001 PROJECT #: 34040 DATE/TIME ENDED: 6/28/22 RS 1700
 ORGANISM ID#: PPC-22-171

Conc.	6/22/22 RS 1450					6/23-22 JC 1040					6/24-22 HP 0835					6-25-22 TG 1225					6-20-22 JC 1030									
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E					
00M	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	8	8	8	8	8
20	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	8	8	8	8	8
35	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	8	8	8	8	8
46	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	8	8	8	8	8
62	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	8	8	8	8	8
82	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	8	8	8	8	8

Conc.	6/27/22 RS 0920					6/28/22 RS 1450					C.V. %	
	A	B	C	D	E	A	B	C	D	E		
00M	8	8	8	8	8	8	8	8	8	8	100.0	0.00
20	8	8	8	8	8	8	8	8	8	8	100.0	0.00
35	8	8	8	8	8	8	8	8	8	8	100.0	0.00
46	8	8	8	8	8	8	8	8	8	8	100.0	0.00
62	8	8	8	8	8	8	8	8	8	8	100.0	0.00
82	8	8	8	8	8	8	8	8	8	8	100.0	0.00

Initials Date/Time

**APPENDIX B
REFERENCE TOXICANTS**

CHRONIC REFERENCE TOXICANT TEST RESULTS

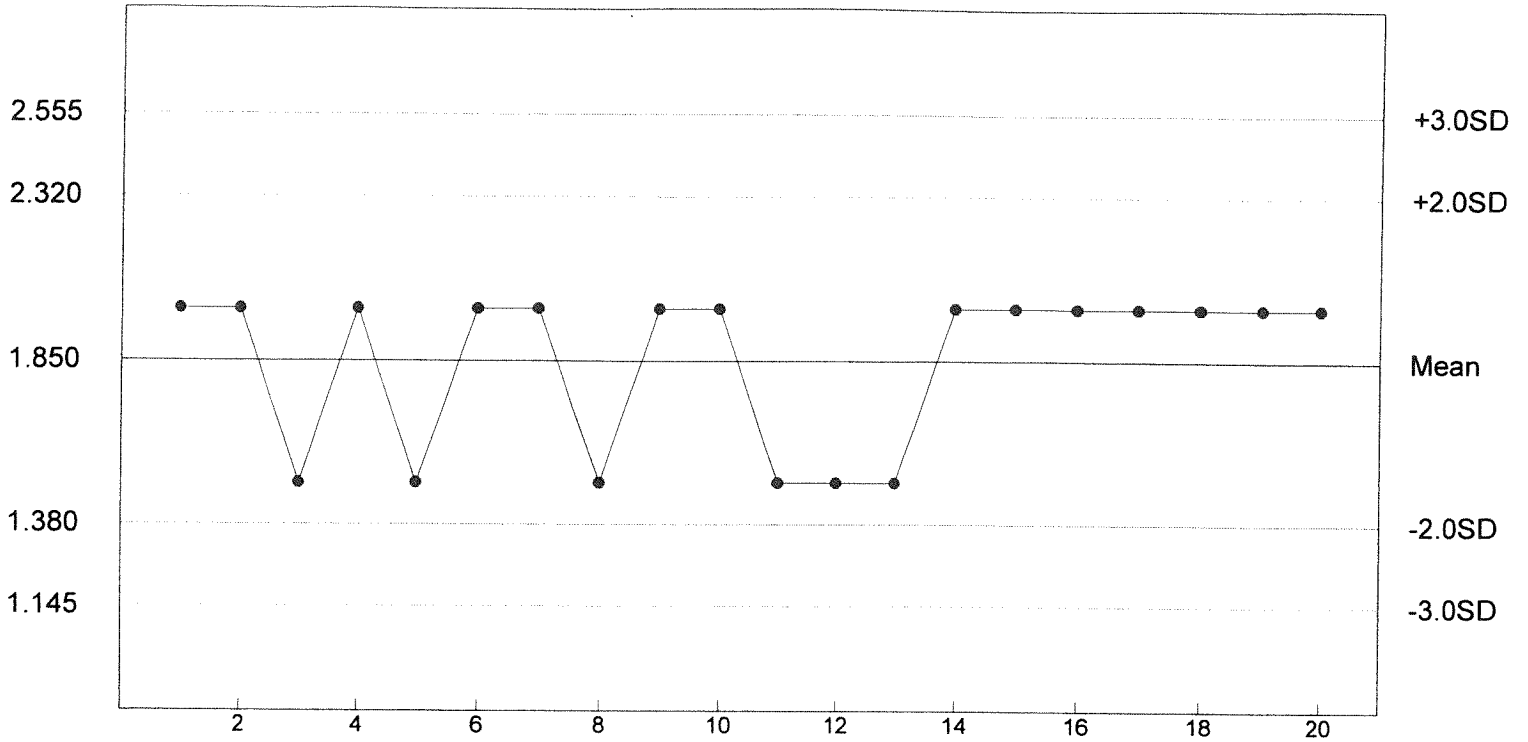
SPECIES: *Ceriodaphnia dubia*
 CHEMICAL: Sodium Chloride
 DURATION: 7-Days
 TEST NUMBER: 6
 TEST DATE: 06/01/22 - 06/08/22
 1545 Hrs - 1545 Hrs
 STATISTICAL METHOD: Dunnetts/Steels

CONCENTRATION (g/L)	NUMBER EXPOSED	NUMBER DEAD
0.5	10	0
1.0	10	0
1.5	10	0
2.0	10	0
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	1.0 g/L	0.5 g/L

Reference Tox Sodium Chloride g/L

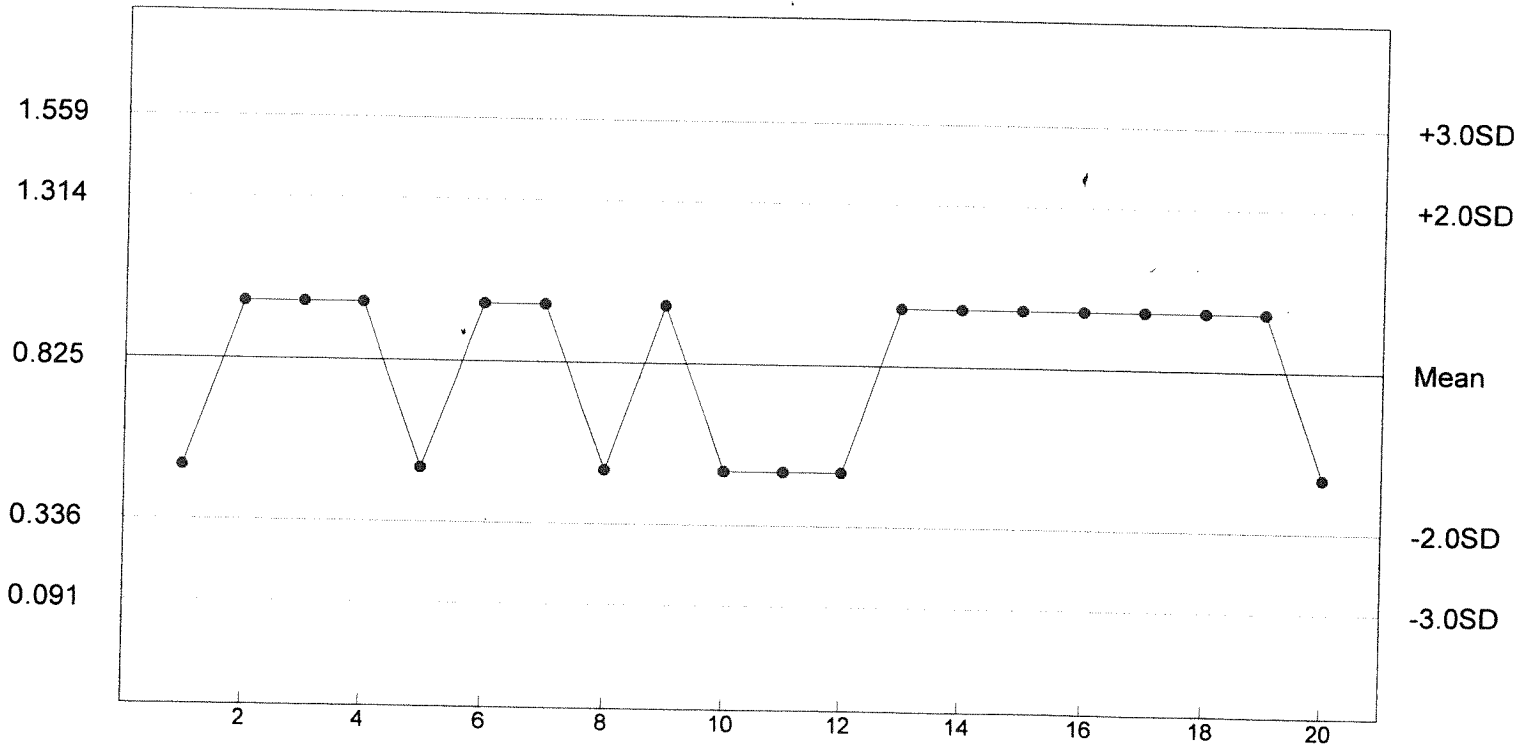
C. dubia Survival - NOEC



n= 20 Mean= 1.850 SD= 0.235 CV= 12.71% Min= 1.500 Max= 2.000

Reference Tox Sodium Chloride g/L

C. dubia Reproduction - NOEC



n= 20 Mean= 0.825 SD= 0.245 CV= 29.66% Min= 0.500 Max= 1.000

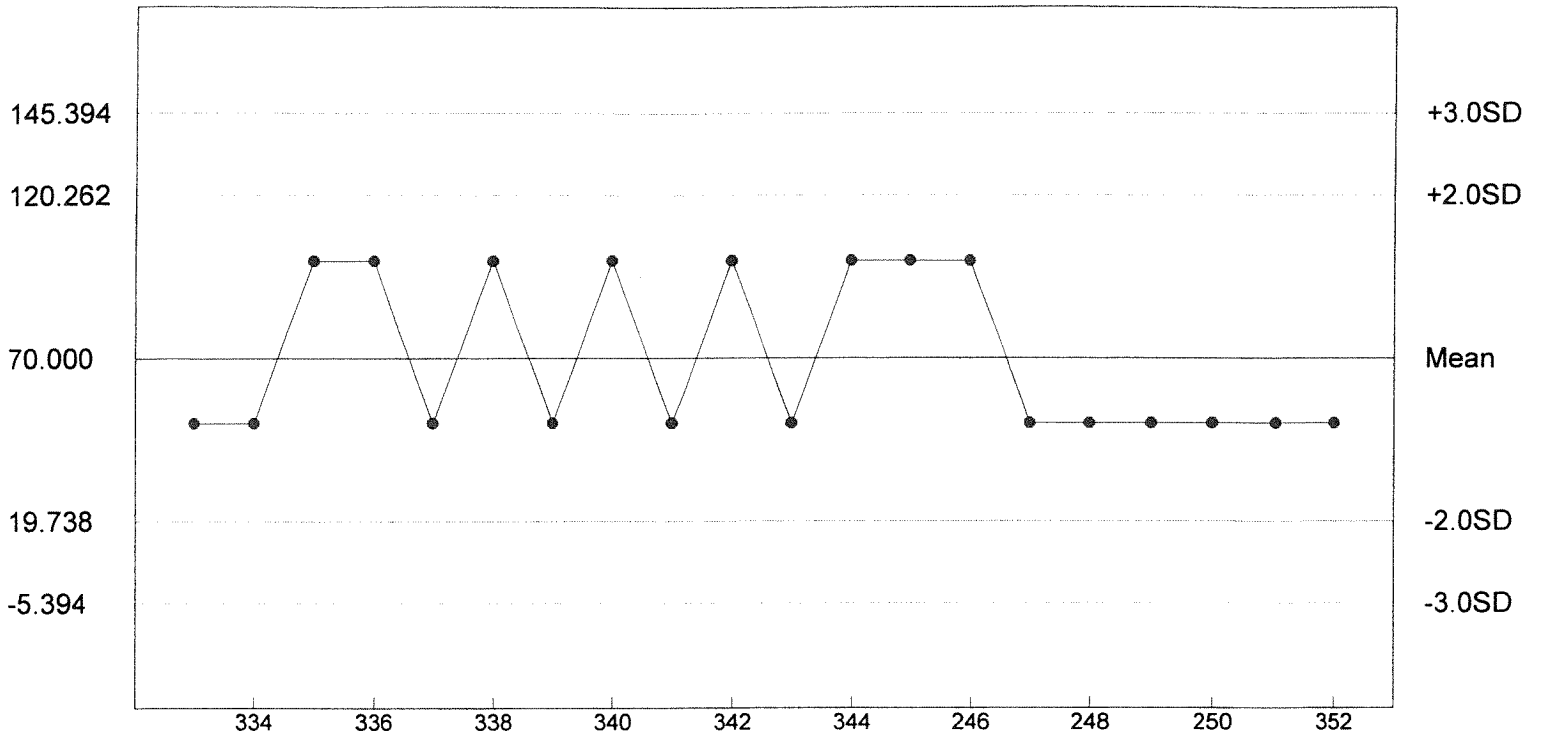
CHRONIC REFERENCE TOXICANT TEST RESULTS

SPECIES: *Pimephales promelas*
 CHEMICAL: Copper Nitrate
 DURATION: 7-Days
 TEST NUMBER: 6
 TEST DATE: 06/01/22 - 06/08/22
 1600 Hrs -1600 Hrs
 STATISTICAL METHOD: Dunnetts/Steels

CONCENTRATION (ug/L)	NUMBER EXPOSED	NUMBER DEAD
12.5	40	0
25	40	0
50	40	1
100	40	15
200	40	26
400	40	40
800	40	40

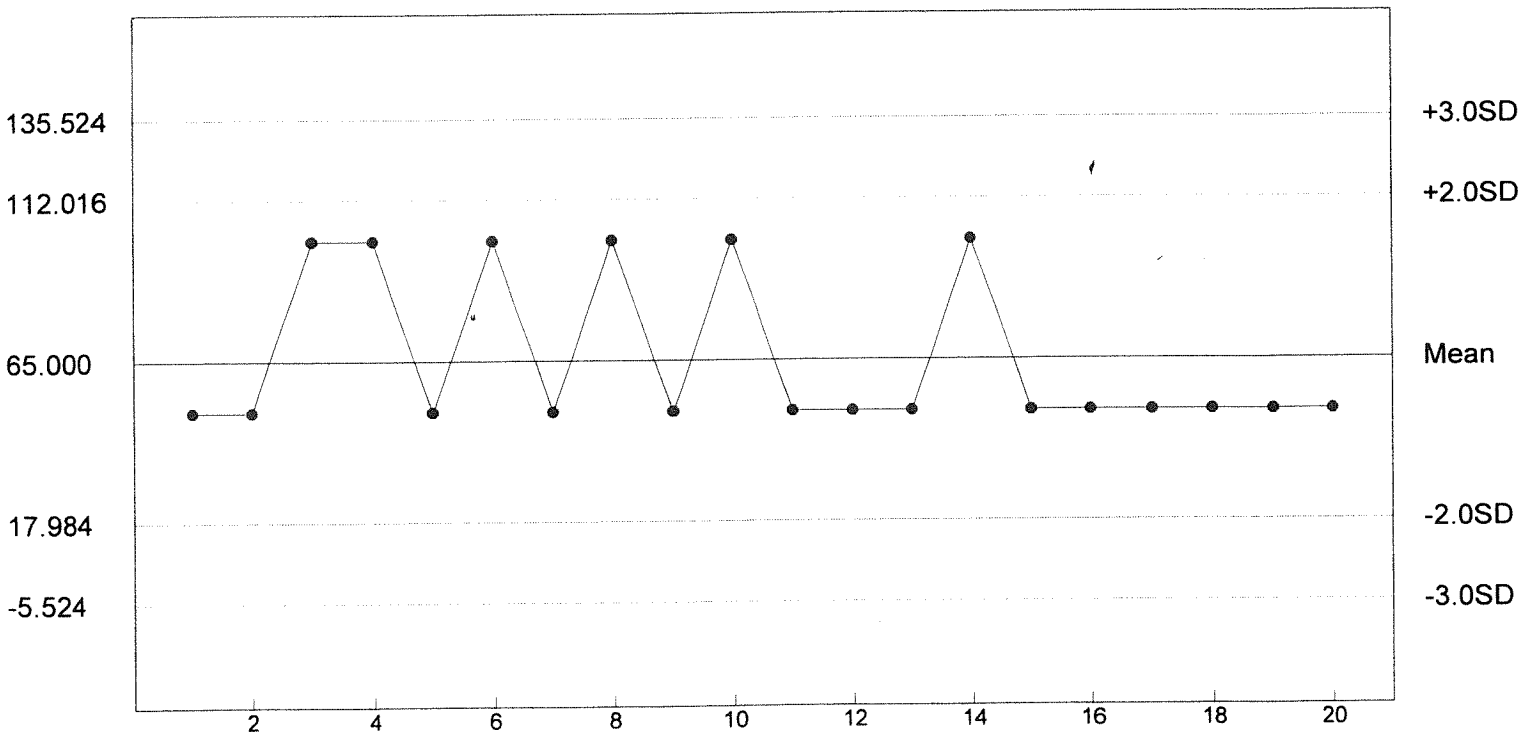
LOEC FOR SURVIVAL	NOEC FOR SURVIVAL	LOEC FOR GROWTH	NOEC FOR GROWTH
100 ug/L	50 ug/L	100 ug/L	50 ug/L

Reference Tox Copper Nitrate ug/L
P. promelas Chronic Survival - NOEC



n= 20 Mean= 70.000 SD= 25.131 CV= 35.90% Min= 50.000 Max= 100.000

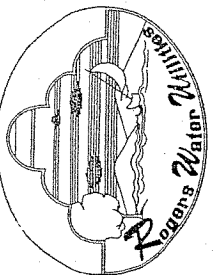
Reference Tox Copper Nitrate ug/L
P. promelas Growth - NOEC



n= 20 Mean= 65.000 SD= 23.508 CV= 36.17% Min= 50.000 Max= 100.000

**APPENDIX C
CHAIN OF CUSTODY SHEETS**

34040



ROGERS POLLUTION CONTROL FACILITY CHAIN OF CUSTODY

SAMPLE DESCRIPTION	SAMPLE ID	COLLECTION		CONTAINER		TYPE C/G	METH A/M	TEMP °C	ANALYSES												
		DATE	TIME	L	G/P				C B O D	N H O 3	T S S	N O 2 & N O 3	T P 4	P O & G N	P H E N O L S	M E T A L S	W E T	T O			
Effluent		On: 6-19-22	0830	21.0	P	C	A	4.1													
Influent		Off: 6-20-22	0830																		
		On: 6-19-22	0830	11.0	P	C	A	3.9													
		Off: 6-20-22	0836																		
		On: _____	_____																		
		Off: _____	_____																		
		On: _____	_____																		
		Off: _____	_____																		
Relinquished by:		Received by:	Date:	Time:	Time:	Relinquished by:	Received by:	Date:	Time:	Relinquished by:	Received by:	Date:	Time:	Relinquished by:	Received by:	Date:	Time:	Relinquished by:	Received by:		
			6-20-22																		
COMMENTS:		SAMPLER(S):																			
		0.9°CIRI		Fed Ex																	
Metals: Ag, As, Be, Cd, Cr, Cu, Mo, Ni, Pb, Sb, Se, Tl, Zn (preserved with HNO ₃)																					
WET: Whole Effluent Toxicity (Biomonitoring)																					
FTO Scan: Table II - Organic Toxic Pollutants as defined by 40 CFR 122 appendix D. (Volatiles, Acid Compounds, Base / Neutral, Pesticides)																					
NH ₃ -N, TN, TP and O&G preserved with H ₂ SO ₄ * CN preserved with NaOH * PHENOL preserved with CuSO ₄ + Phos Acid																					

Received by: *Bradley S.* Date: *6-21-22* Time: *1000*

0.9°CIRI

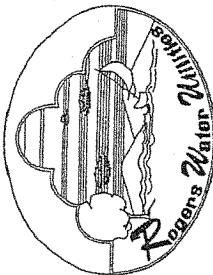
Fed Ex

On: *Bradley S.*

Off: *Bradley S.*

Received by: *Matt Horner* Date: *6-21-22* Time: *1000*

Rogers 34040



ROGERS POLLUTION CONTROL FACILITY
CHAIN OF CUSTODY

ANALYSES

SAMPLE DESCRIPTION	SAMPLE ID	COLLECTION		CONTAINER		TYPE	METH A/M	TEMP °C	TSS	COD	NH3	NO2 & NO3	TP	PO4	O&G	PHENOLS	METALS	WET	TO		
		DATE	TIME	L	G/P																
Effluent		On: 6-21-22	0830	21.0	P	C	A	4.1										X			
Influent		On: 6-21-22	0836	19.0	P	C	A	4.3													
		Off: 6-22-22	0836																		
		On:																			
		Off:																			
		On:																			
		Off:																			
Relinquished by:		Received by:	Date:	Time:	Relinquished by:	Received by:	Date:	Time:	Relinquished by:	Received by:	Date:	Time:	Relinquished by:	Received by:	Date:	Time:	Relinquished by:	Received by:	Date:	Time:	
Bradley S			6-22-22																		
Relinquished by:		Received by:	Date:	Time:	Relinquished by:	Received by:	Date:	Time:	Relinquished by:	Received by:	Date:	Time:	Relinquished by:	Received by:	Date:	Time:	Relinquished by:	Received by:	Date:	Time:	
COMMENTS:		<p>-1.3°C IR1</p> <p>FedEx</p> <p>On: Bradley S. Off: Bradley S.</p> <p>Received by: Matt Horner 6-22-22 230</p> <p>SAMPLER(S):</p>																			

* Metals: Ag, As, Be, Cd, Cr, Cu, Mo, Ni, Pb, Sb, Se, Te, Zn (preserved with HNO₃)

* WET: Whole Effluent Toxicity (Biomonitoring)

* TIO Scan: Table II - Organic Toxic Pollutants as defined by 40 CFR 122 appendix D. (Volatiles, Acid Compounds, Base / Neutral, Pesticides)

* NH3-N, TN, TP and O&G preserved with H₂SO₄ * CN preserved with NaOH * PHENOL preserved with CuSO₄ + Phos Acid

**CITY OF ROGERS
 NPDES PERMIT NO. AR0043397
 AFIN NUMBER: 04-00155
 BIOMONITORING REPORTING
 TEST DATE: 06/21/22**

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.	82%
(C) Report the NOEC value for reproduction, Parameter No. TPP3B.	82%
(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 (critical dilution or control) Coefficient of Variation, Parameter No. TQP3B.	12.74%

II. *Pimephales promelas* (fathead minnow)

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.	82%
(C) Report the NOEC value for growth, Parameter No. TPP6C.	82%
(D) If the No Observed Effect Concentration (NOEC) for growth is less than the critical dilution, enter a "1"; otherwise, enter a "0". Parameter No. TGP6C.	0
(E) Report the highest (critical dilution or control) Coefficient of Variation, Parameter No. TQP6C.	5.39%
22414 - 10	82%
22414 - PO	82%