

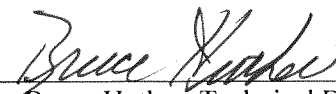
CITY OF ROGERS
OUTFALL 001

Chronic Biomonitoring Report
Permit Number NPDES AR0043397
AFIN 04-00155

Ceriodaphnia dubia
Pimephales promelas

October 4, 2022

Reviewed by:



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TOXICITY TEST REPORT - CHRONIC

Client City of Rogers Laboratory I.D. 34423
Permit No. NPDES AR0043397 Begin Date October 4, 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 Huthur & Associates on October 4, October 6, and October 8, 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 1545 hours, October 4, 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 1545 hours, October 11, 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
NOEC: 82% Effluent

PMSD: 9.3%

TEST SETUP
Pimephales promelas



The seven-day *Pimephales promelas* larval survival and growth test was initiated at 1550 hours, October 4, 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 1550 hours, October 11, 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).

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

CLIENT	City of Rogers	SAMPLE TYPE	24 Hour Composite
NPDES #	AR0043397	DATE COLLECTED	10/03/22 10/05/22 10/07/22
LAB ID #	34423	DATE RECEIVED	10/04/22 10/06/22 10/08/22
TEST TYPE	7 Day Chronic	BEGIN DATE/TIME	10/04/22 1545
TEST ORGANISM	<i>Ceriodaphnia dubia</i>	END DATE/TIME	10/11/22 1545
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. cndl.
DILUTION WATER	Laboratory	TECHNICIAN	M. Horner

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
10/05/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/06/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/07/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/08/22	3	5	3	4	2	4	4	2	5	3
	3	5	3	4	2	4	4	2	5	3
10/09/22	A	A	A	A	A	A	A	A	A	A
	3	5	3	4	2	4	4	2	5	3
10/10/22	8	10	7	9	11	8	7	6	10	9
	11	15	10	13	13	12	11	8	15	12
10/11/22	13	14	12	13	12	14	13	13	14	12
	24	29	22	26	25	26	24	21	29	24
x # Young 25.0 C.V. 10.50%										
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
10/05/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/06/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/07/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/08/22	3	4	4	4	2	3	4	2	3	5
	3	4	4	4	2	3	4	2	3	5
10/09/22	A	A	A	A	A	A	A	A	A	A
	3	4	4	4	2	3	4	2	3	5
10/10/22	8	9	7	6	10	11	8	10	8	9
	11	13	11	10	12	14	12	12	11	14
10/11/22	14	14	13	12	14	13	12	14	12	13
	25	27	24	22	26	27	24	26	23	27
x # Young 25.1 C.V. 7.14%										
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
10/05/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/06/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/07/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/08/22	2	4	3	5	5	3	2	4	2	3
	2	4	3	5	5	3	2	4	2	3
10/09/22	A	A	A	A	A	A	A	A	A	A
	2	4	3	5	5	3	2	4	2	3
10/10/22	11	7	10	8	9	6	8	10	7	10
	13	11	13	13	14	9	10	14	9	13
10/11/22	13	12	12	14	13	14	12	13	12	14
	26	23	25	27	27	23	22	27	21	27
x # Young 24.8 C.V. 9.47%										
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
10/05/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/06/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/07/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/08/22	5	4	4	3	2	5	3	3	3	2
	5	4	4	3	2	5	3	3	3	2
10/09/22	A	A	A	A	A	A	A	A	A	A
	5	4	4	3	2	5	3	3	3	2
10/10/22	8	8	9	7	10	8	11	10	7	8
	13	12	13	10	12	13	14	13	10	10
10/11/22	14	12	14	13	12	13	13	14	12	13
	27	24	27	23	24	26	27	27	22	23
x # Young 25.0 C.V. 8.00%										
x%Survival 100% C.V. 0.00%										

where: 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

Rogers

Lab ID# 34423

Test Date: October 4, 2022

62%Effluent										
Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
10/05/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/06/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/07/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/08/22	5	5	3	4	4	5	3	2	3	4
	5	5	3	4	4	5	3	2	3	4
10/09/22	A	A	A	A	A	A	A	A	A	A
	5	5	3	4	4	5	3	2	3	4
10/10/22	9	11	7	6	8	11	8	10	9	10
	14	16	10	10	12	16	11	12	12	14
10/11/22	14	12	12	13	14	13	13	12	12	14
	28	28	22	23	26	29	24	24	24	28
x# Young 25.6 C.V. 9.78% 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
10/05/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/06/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/07/22	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
10/08/22	2	5	5	4	2	4	3	3	5	2
	2	5	5	4	2	4	3	3	5	2
10/09/22	A	A	A	A	A	A	A	A	A	A
	2	5	5	4	2	4	3	3	5	2
10/10/22	9	10	7	10	6	8	11	10	9	8
	11	15	12	14	8	12	14	13	14	10
10/11/22	14	12	12	13	12	14	12	13	12	13
	25	27	24	27	20	26	26	26	26	23
x# Young 25.0 C.V. 8.64% 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

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

Rogers

Lab ID# 34423

Test Date: October 4, 2022

WET CHEMISTRY MEASUREMENTS

Date	Time	Temp	Samp. No.	pH of Solution						Analyst
				CON	26%	35%	46%	62%	82%	
10/04/22	Start	25.0	1	8.28	8.22	8.24	8.16	8.10	8.02	HB
10/05/22	24 Hr.	23.8	1	8.27	8.20	8.17	8.16	8.14	8.10	HB
10/05/22	Renew	25.0	1	8.21	8.16	8.13	8.12	8.11	8.05	HB
10/06/22	48 Hr.	24.0	1	8.24	8.12	8.09	7.93	7.77	7.69	JP
10/06/22	Renew	25.0	2	8.35	8.08	7.98	7.89	7.74	7.65	JP
10/07/22	72 Hr.	24.2	2	8.28	8.08	8.08	8.03	7.92	7.86	JP
10/07/22	Renew	25.0	2	8.27	8.21	8.06	8.09	7.93	7.90	JP
10/08/22	96 Hr.	24.2	2	8.49	8.23	8.12	8.06	7.98	7.92	JP
10/08/22	Renew	25.0	3	8.43	8.18	8.08	8.02	7.91	7.83	JP
10/09/22	120 Hr.	23.8	3	8.31	8.23	8.09	8.05	7.94	7.90	JP
10/09/22	Renew	25.0	3	8.36	8.15	8.06	8.03	7.88	7.84	JP
10/10/22	144 Hr.	23.5	3	8.16	8.02	7.93	7.89	7.85	7.76	HB
10/10/22	Renew	25.0	3	8.05	7.96	7.87	7.84	7.77	7.73	HB
10/11/22	168 Hr.	23.7	3	8.48	8.43	8.41	8.39	8.38	8.36	HB

Date	Time	Temp	Samp. No.	DO (mg/L) of Solution						Analyst
				CON	26%	35%	46%	62%	82%	
10/04/22	Start	25.0	1	7.04	8.36	7.95	8.49	8.56	7.68	HB
10/05/22	24 Hr.	23.8	1	7.19	7.98	7.79	8.02	7.87	8.09	HB
10/05/22	Renew	25.0	1	7.66	8.50	8.28	8.52	8.45	7.84	HB
10/06/22	48 Hr.	24.0	1	8.04	8.49	8.59	8.27	8.03	8.02	JP
10/06/22	Renew	25.0	2	8.36	8.03	7.89	7.85	8.55	7.94	JP
10/07/22	72 Hr.	24.2	2	8.03	8.22	7.91	7.97	8.04	8.08	JP
10/07/22	Renew	25.0	2	8.09	7.70	7.97	8.05	7.98	8.06	JP
10/08/22	96 Hr.	24.2	2	7.97	8.50	8.60	8.07	7.84	8.12	JP
10/08/22	Renew	25.0	3	8.15	8.37	8.05	8.59	8.26	8.37	JP
10/09/22	120 Hr.	23.8	3	8.27	8.47	7.92	7.93	8.07	7.86	JP
10/09/22	Renew	25.0	3	7.66	8.20	8.02	8.54	8.14	8.17	JP
10/10/22	144 Hr.	23.5	3	7.90	8.05	8.02	8.52	8.14	8.29	HB
10/10/22	Renew	25.0	3	7.86	8.31	8.51	8.55	7.69	8.00	HB
10/11/22	168 Hr.	23.7	3	7.72	8.54	8.44	8.60	7.68	7.73	HB

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

Rogers

Lab ID# 34423

Test Date: October 4, 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 ₃ mg/L ¹	Analyst
10/04/22	1	7.95	7.99	116	82	765	<0.01	N/A	HB
10/06/22	2	7.63	8.27	120	104	718	<0.01	N/A	JP
10/08/22	3	7.75	8.40	112	94	813	<0.01	N/A	JP
10/04/22	CON	8.28	7.04	128	88	460	-	N/A	HB

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	21.000	29.000	25.000
2	26% Effluent	10	22.000	27.000	25.100
3	35% Effluent	10	21.000	27.000	24.800
4	46% Effluent	10	22.000	27.000	25.000
5	62% Effluent	10	22.000	29.000	25.600
6	82% Effluent	10	20.000	27.000	25.000

Summary Statistics on Transformed Data Table 2 of 2

Grp	Identification	Variance	Sd	Sem	C.V.%
1	Control	6.889	2.625	0.830	10.50
2	26% Effluent	3.211	1.792	0.567	7.14
3	35% Effluent	5.511	2.348	0.742	9.47
4	46% Effluent	4.000	2.000	0.632	8.00
5	62% Effluent	6.267	2.503	0.792	9.78
6	82% Effluent	4.667	2.160	0.683	8.64

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	4	16	18	20	2

Calculated Chi-Square goodness of fit test statistic = 4.2903

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 = 1.72

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	3.683	0.737	0.145
Within (Error)	54	274.900	5.091	
Total	59	278.583		

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	Mean	T Stat	Sig
			Calculated In Original Units		
1	Control	25.000	25.000		
2	26% Effluent	25.100	25.100	-0.099	
3	35% Effluent	24.800	24.800	0.198	
4	46% Effluent	25.000	25.000	0.000	
5	62% Effluent	25.600	25.600	-0.595	
6	82% Effluent	25.000	25.000	0.000	

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
			Diff (In Orig. Units)		from Control
1	Control	10			
2	26% Effluent	10	2.331	9.3	-0.100
3	35% Effluent	10	2.331	9.3	0.200
4	46% Effluent	10	2.331	9.3	0.000
5	62% Effluent	10	2.331	9.3	-0.600
6	82% Effluent	10	2.331	9.3	0.000

Huthner 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	10/03/22 10/05/22 10/07/22
LAB ID #	34423	DATE RECEIVED	10/04/22 10/06/22 10/08/22
TEST TYPE	7 Day Chronic	BEGIN DATE/TIME	10/04/22 1550
TEST ORGANISM	<i>Pimephales promelas</i>	END DATE/TIME	10/11/22 1550
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. endl.
DILUTION WATER	Laboratory	TECHNICIAN	J. Castillo

SURVIVAL SUMMARY

Conc.	10/05/22					10/06/22					10/07/22					10/08/22					10/09/22									
	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	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	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.	10/10/22					10/11/22					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	0.4520	0.4270	0.4450	0.4680	0.4370	0.4458	3.48
26%	0.4630	0.4560	0.4720	0.4500	0.4830	0.4648	2.81
35%	0.4290	0.4760	0.4830	0.4440	0.4620	0.4588	4.87
46%	0.4760	0.4200	0.4760	0.4590	0.4860	0.4634	5.64
62%	0.4540	0.4730	0.4620	0.4850	0.4230	0.4594	5.11
82%	0.4680	0.4870	0.4290	0.4630	0.4540	0.4602	4.61

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

Rogers

Lab ID# 34423

Test Date: October 4, 2022

WET CHEMISTRY MEASUREMENTS

Date	Time	Temp	Samp. No.	pH of Solution						Analyst
				CON	26%	35%	46%	62%	82%	
10/04/22	Start	25.0	1	8.28	8.22	8.24	8.16	8.10	8.02	HB
10/05/22	24 Hr.	24.0	1	8.66	8.52	8.51	8.46	8.41	8.33	HB
10/05/22	Renew	25.0	1	8.21	8.16	8.13	8.12	8.11	8.05	HB
10/06/22	48 Hr.	24.1	1	8.37	8.31	8.31	8.27	8.26	8.13	JP
10/06/22	Renew	25.0	2	8.35	8.08	7.98	7.89	7.74	7.65	JP
10/07/22	72 Hr.	24.3	2	8.45	8.42	8.38	8.35	8.30	8.27	JP
10/07/22	Renew	25.0	2	8.27	8.21	8.06	8.09	7.93	7.90	JP
10/08/22	96 Hr.	24.3	2	8.50	8.45	8.42	8.41	8.39	8.30	JP
10/08/22	Renew	25.0	3	8.43	8.18	8.08	8.02	7.91	7.83	JP
10/09/22	120 Hr.	24.0	3	8.19	8.19	8.20	8.16	8.17	8.17	JP
10/09/22	Renew	25.0	3	8.36	8.15	8.06	8.03	7.88	7.84	JP
10/10/22	144 Hr.	23.8	3	8.10	8.11	8.12	8.07	8.03	8.01	HB
10/10/22	Renew	25.0	3	8.05	7.96	7.87	7.84	7.77	7.73	HB
10/11/22	168 Hr.	23.9	3	8.16	8.12	8.07	8.09	8.05	8.03	HB

Date	Time	Temp	Samp. No.	DO (mg/L) of Solution						Analyst
				CON	26%	35%	46%	62%	82%	
10/04/22	Start	25.0	1	7.04	8.36	7.95	8.49	8.56	7.68	HB
10/05/22	24 Hr.	24.0	1	7.66	8.46	8.53	8.37	8.41	8.19	HB
10/05/22	Renew	25.0	1	7.66	8.50	8.28	8.52	8.45	7.84	HB
10/06/22	48 Hr.	24.1	1	8.30	7.85	7.88	7.73	7.77	8.60	JP
10/06/22	Renew	25.0	2	8.36	8.03	7.89	7.85	8.55	7.94	JP
10/07/22	72 Hr.	24.3	2	7.63	7.74	8.12	8.44	7.66	7.72	JP
10/07/22	Renew	25.0	2	8.09	7.70	7.97	8.05	7.98	8.06	JP
10/08/22	96 Hr.	24.3	2	8.26	8.15	7.97	8.19	7.84	7.66	JP
10/08/22	Renew	25.0	3	8.15	8.37	8.05	8.59	8.26	8.37	JP
10/09/22	120 Hr.	24.0	3	7.81	7.85	7.71	7.96	8.29	8.18	JP
10/09/22	Renew	25.0	3	7.66	8.20	8.02	8.54	8.14	8.17	JP
10/10/22	144 Hr.	23.8	3	8.10	8.09	8.05	8.23	7.97	8.61	HB
10/10/22	Renew	25.0	3	7.86	8.31	8.51	8.55	7.69	8.00	HB
10/11/22	168 Hr.	23.9	3	8.20	8.26	7.73	7.99	7.87	8.06	HB

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

Rogers

Lab ID# 34423

Test Date: October 4, 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 ₃ mg/L ¹	Analyst
10/04/22	1	7.95	7.99	116	82	765	<0.01	N/A	HB
10/06/22	2	7.63	8.27	120	104	718	<0.01	N/A	JP
10/08/22	3	7.75	8.40	112	94	813	<0.01	N/A	JP
10/04/22	CON	8.28	7.04	128	88	460	-	N/A	HB

¹ Measurements taken in 100% solution.

PIMEPHALES PROMELAS STATISTICAL ANALYSES
 Growth

Summary Statistics on Transformed Data Table 1 of 2

Grp	Identification	N	Min	Max	Mean
1	Control	5	0.427	0.468	0.446
2	26% Effluent	5	0.450	0.483	0.465
3	35% Effluent	5	0.429	0.483	0.459
4	46% Effluent	5	0.420	0.486	0.463
5	62% Effluent	5	0.423	0.485	0.459
6	82% Effluent	5	0.429	0.487	0.460

Summary Statistics on Transformed Data Table 2 of 2

Grp	Identification	Variance	Sd	Sem	C.V.%
1	Control	0.000	0.016	0.007	3.48
2	26% Effluent	0.000	0.013	0.006	2.81
3	35% Effluent	0.000	0.022	0.010	4.87
4	46% Effluent	0.001	0.026	0.012	5.64
5	62% Effluent	0.001	0.023	0.010	5.11
6	82% Effluent	0.000	0.021	0.009	4.61

Shapiro - Wilk's Test For Normality

D = 0.010

W = 0.949

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 = 2.30

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	0.001	0.000	0.528
Within (Error)	24	0.010	0.000	
Total	29	0.012		

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

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

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

Grp	Identification	Transformed Mean	Mean Calculated In Original Units	T Stat	Sig
1	Control	0.446	0.446		
2	26% Effluent	0.465	0.465	-1.445	
3	35% Effluent	0.459	0.459	-0.989	
4	46% Effluent	0.463	0.463	-1.338	
5	62% Effluent	0.459	0.459	-1.034	
6	82% Effluent	0.460	0.460	-1.095	

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

No statistically significant difference

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

Grp	Identification	Num of Reps	Minimum Diff (In Orig. Units)	Sig % of Control	Difference from Control
1	Control	5			
2	26% Effluent	5	0.031	7.0	-0.019
3	35% Effluent	5	0.031	7.0	-0.013
4	46% Effluent	5	0.031	7.0	-0.018
5	62% Effluent	5	0.031	7.0	-0.014
6	82% Effluent	5	0.031	7.0	-0.014

**APPENDIX A
RAW DATA**

7-DAY CERIODAPHnia DUBIA SURVIVAL & REPRODUCTION
DAILY RAW DATA TABLE
PAGE 1 OF 2

CLIENT Rogers
OUTFALL 001
LAB ID # 34423

START DATE/TIME 10-4-22 MH 1545
END DATE/TIME 10-11-22 TG 1545

Gn

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
10/5	A	A	A	A	A	A	A	A	A	A	MH	1545
10/6	A	A	A	A	A	A	A	A	A	A	MH	1400
10/7	A	A	A	A	A	A	A	A	A	A	TG	1200
10/8	3	5	3	4	2	4	4	2	5	3	Jc	1445
10/9	A	A	A	A	A	A	A	A	A	A	Jc	1115
10/10	8	10	7	9	11	8	7	6	10	9	TG	1400
10/11	13	14	12	13	12	14	13	13	14	12	TG	1545
	24	29	24	26	25	26	24	21	29	24		

22

\bar{x} # Young w/o Dead = 25.0 CV% = 10.50
 \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
10/5	A	A	A	A	A	A	A	A	A	A	MH	1545
10/6	A	A	A	A	A	A	A	A	A	A	MH	1400
10/7	A	A	A	A	A	A	A	A	A	A	TG	1200
10/8	3	4	4	4	2	3	4	2	3	5	Jc	1445
10/9	A	A	A	A	A	A	A	A	A	A	Jc	1115
10/10	8	9	7	6	10	11	8	10	8	9	TG	1400
10/11	14	14	13	12	14	13	12	14	12	13	TG	1545
	25	27	24	22	26	27	24	26	23	27		

\bar{x} # Young w/o Dead = 25.1 CV% = 7.14
 \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
10/5	A	A	A	A	A	A	A	A	A	A	MH	1545
10/6	A	A	A	A	A	A	A	A	A	A	MH	1400
10/7	A	A	A	A	A	A	A	A	A	A	TG	1200
10/8	2	4	3	5	5	3	2	4	2	3	Jc	1445
10/9	A	A	A	A	A	A	A	A	A	A	Jc	1115
10/10	11	7	10	8	9	6	8	10	7	10	TG	1400
10/11	13	12	12	14	13	14	12	13	12	14	TG	1545
	26	23	25	27	27	23	22	27	21	27		

\bar{x} # Young w/o Dead = 24.8 CV% = 9.47
 \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
10/5	A	A	A	A	A	A	A	A	A	A	MH	1545
10/6	A	A	A	A	A	A	A	A	A	A	MH	1400
10/7	A	A	A	A	A	A	A	A	A	A	TG	1200
10/8	5	4	4	3	2	5	3	3	3	2	Jc	1445
10/9	A	A	A	A	A	A	A	A	A	A	Jc	1115
10/10	8	8	9	7	10	8	11	10	7	8	TG	1400
10/11	14	12	14	13	12	13	13	14	12	13	TG	1545
	27	24	27	23	24	26	27	27	22	23		

\bar{x} # Young w/o Dead = 25.0 CV% = 8.00
 \bar{x} # Young w/Dead = CV% =
 \bar{x} % Survival = 100 CV% = 0.00

7-DAY CERIODAPHNIA DUBIA SURVIVAL & REPRODUCTION

DAILY RAW DATA TABLE

PAGE 2 OF 2

CLIENT Rogers

START DATE/TIME 10-4-22 MH 1545

OUTFALL 001

END DATE/TIME 10-11-22 TG 1545

LAB ID # 34423

62

82

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
10/5	A	A	A	A	A	A	A	A	A	A	MH	1545
10/6	A	A	A	A	A	A	A	A	A	A	MH	1400
10/7	A	A	A	A	A	A	A	A	A	A	TG	1200
10/8	5	5	3	4	4	5	3	2	3	4	Jc	1445
10/9	A	A	A	A	A	A	A	A	A	A	Jc	1115
10/10	9	11	7	6	8	11	8	10	9	10	TG	1400
10/11	14	12	12	13	14	13	13	12	12	14	TG	1545

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
10/5	A	A	A	A	A	A	A	A	A	A	MH	1545
10/6	A	A	A	A	A	A	A	A	A	A	MH	1400
10/7	A	A	A	A	A	A	A	A	A	A	TG	1200
10/8	2	5	5	4	2	4	3	3	5	2	Jc	1445
10/9	A	A	A	A	A	A	A	A	A	A	Jc	1115
10/10	9	10	7	10	6	8	11	10	9	8	TG	1400
10/11	14	12	12	13	12	14	12	13	12	13	TG	1545

\bar{x} # Young w/o Dead = 25.6 CV% = 9.78

\bar{x} # Young w/o Dead = 25.0 CV% = 8.64

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

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

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

\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/o Dead = CV% =

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

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

\bar{x} % Survival = CV% =

\bar{x} % Survival = CV% =

① 10-7-22

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

CLIENT/FACILITY: Rogers DATE/TIME STARTED: 10-4-22 JK 1550

OUTFALL # 001 PROJECT # 34423

DATE/TIME ENDED: 10-11-22 JK 1550

ORGANISM ID# PP0-22-276

Conc.	10-5-22 JK 1550					10-6-22 JK 925					10-7-22 NB 840					10-8-22 RS 0840					10-9-22 RS 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					
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	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	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
Initials Date/Time																														

Conc.	10-10-22 NB 8:40					10-11-22 JK 1550					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
26	8	8	8	8	8	8	8	8	8	8	100.0
35	8	8	8	8	8	8	8	8	8	8	100.0
46	8	8	8	8	8	8	8	8	8	8	100.0
62	8	8	8	8	8	8	8	8	8	8	100.0
82	8	8	8	8	8	8	8	8	8	8	100.0
Initials Date/Time	10-10-22 NB 8:40					10-11-22 JK 1550					

**APPENDIX B
REFERENCE TOXICANTS**

CHRONIC REFERENCE TOXICANT TEST RESULTS

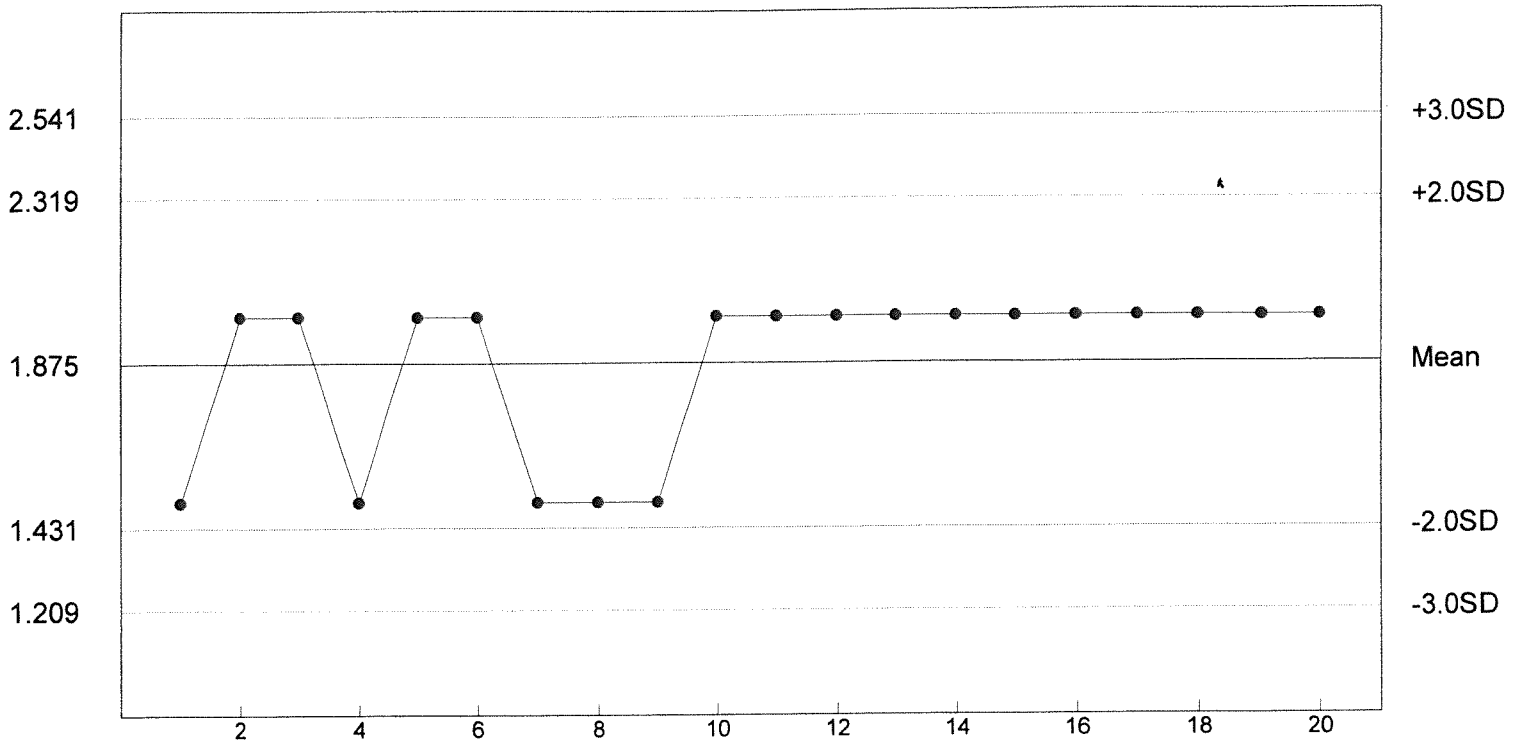
SPECIES: *Ceriodaphnia dubia*
 CHEMICAL: Sodium Chloride
 DURATION: 7-Days
 TEST NUMBER: 10
 TEST DATE: 10/07/22 - 10/14/22
 1500 Hrs - 1500 Hrs
 STATISTICAL METHOD: Dunnetts/Steels

CONCENTRATION (g/L)	NUMBER EXPOSED	NUMBER DEAD
0.5	10	0
1.0	10	0
1.5	10	0
2.0	10	1
2.5	10	9
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	1.0 g/L

Reference Tox Sodium Chloride g/L

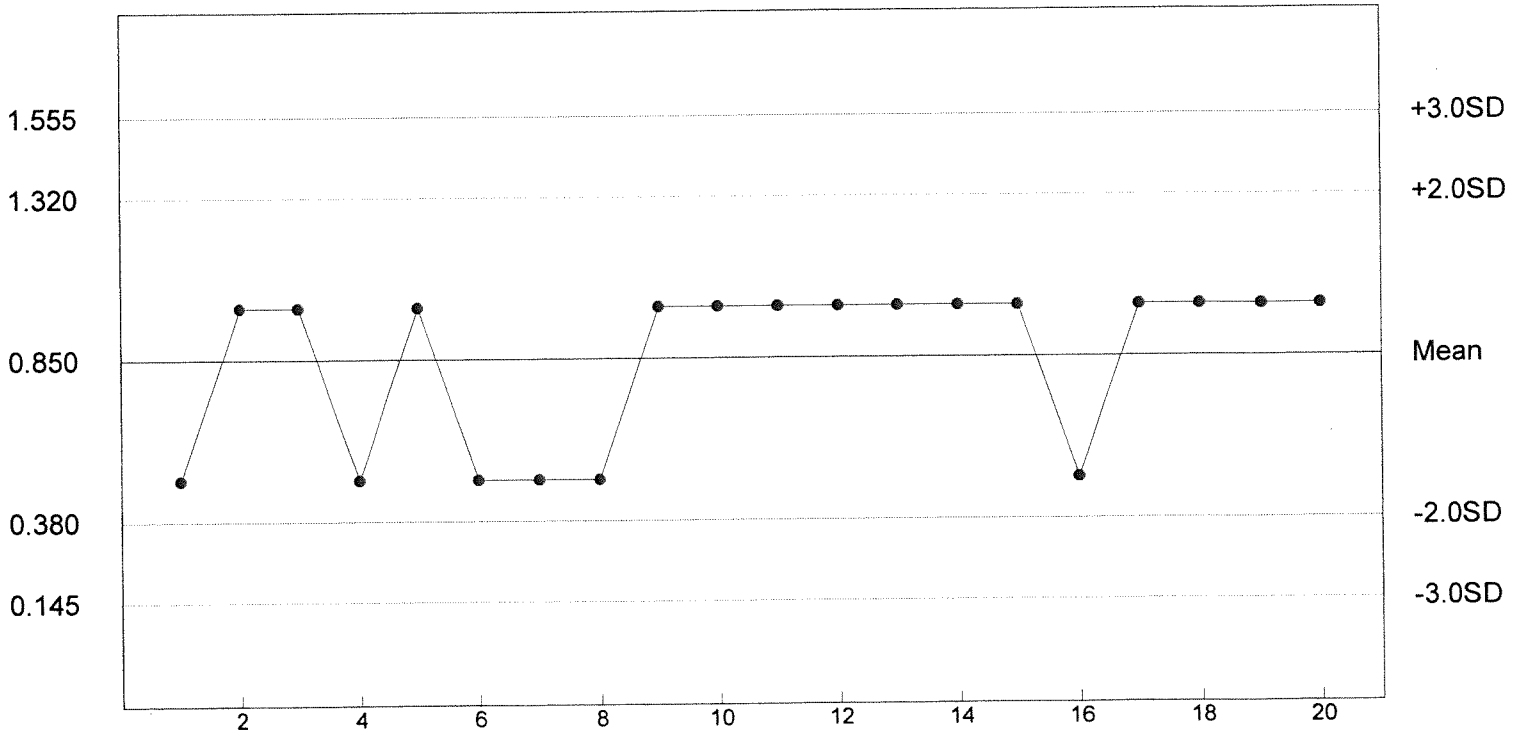
C. dubia Survival - NOEC



n= 20 Mean= 1.875 SD= 0.222 CV= 11.85% Min= 1.500 Max= 2.000

Reference Tox Sodium Chloride g/L

C. dubia Reproduction - NOEC



n= 20 Mean= 0.850 SD= 0.235 CV= 27.66% Min= 0.500 Max= 1.000

CHRONIC REFERENCE TOXICANT TEST RESULTS

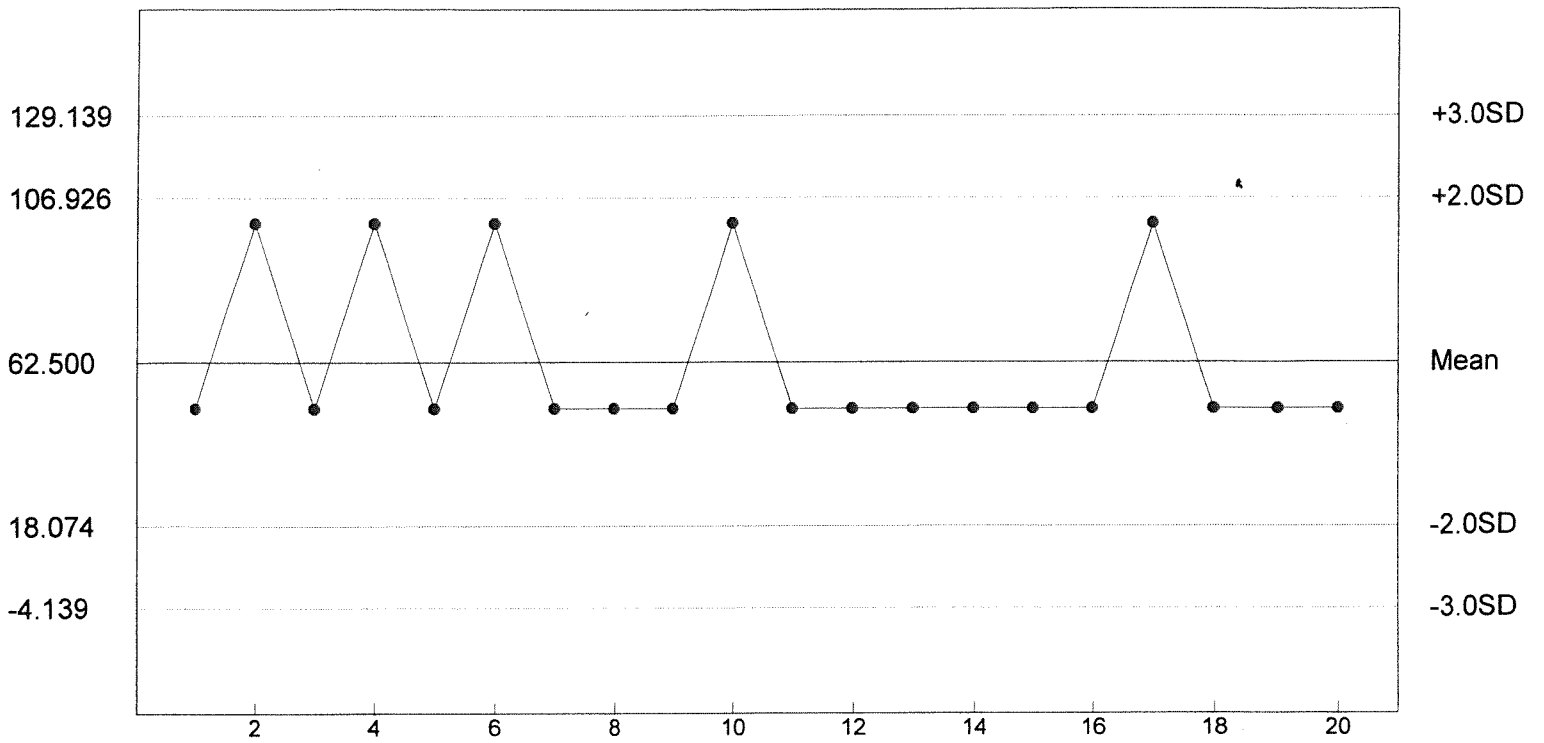
SPECIES: *Pimephales promelas*
 CHEMICAL: Copper Nitrate
 DURATION: 7-Days
 TEST NUMBER: 10
 TEST DATE: 10/07/22 - 10/14/22
 1400 Hrs -1400 Hrs
 STATISTICAL METHOD: Dunnetts/Steels

CONCENTRATION (ug/L)	NUMBER EXPOSED	NUMBER DEAD
12.5	40	0
25	40	0
50	40	0
100	40	1
200	40	32
400	40	40
800	40	40

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

Reference Tox Copper Nitrate ug/L

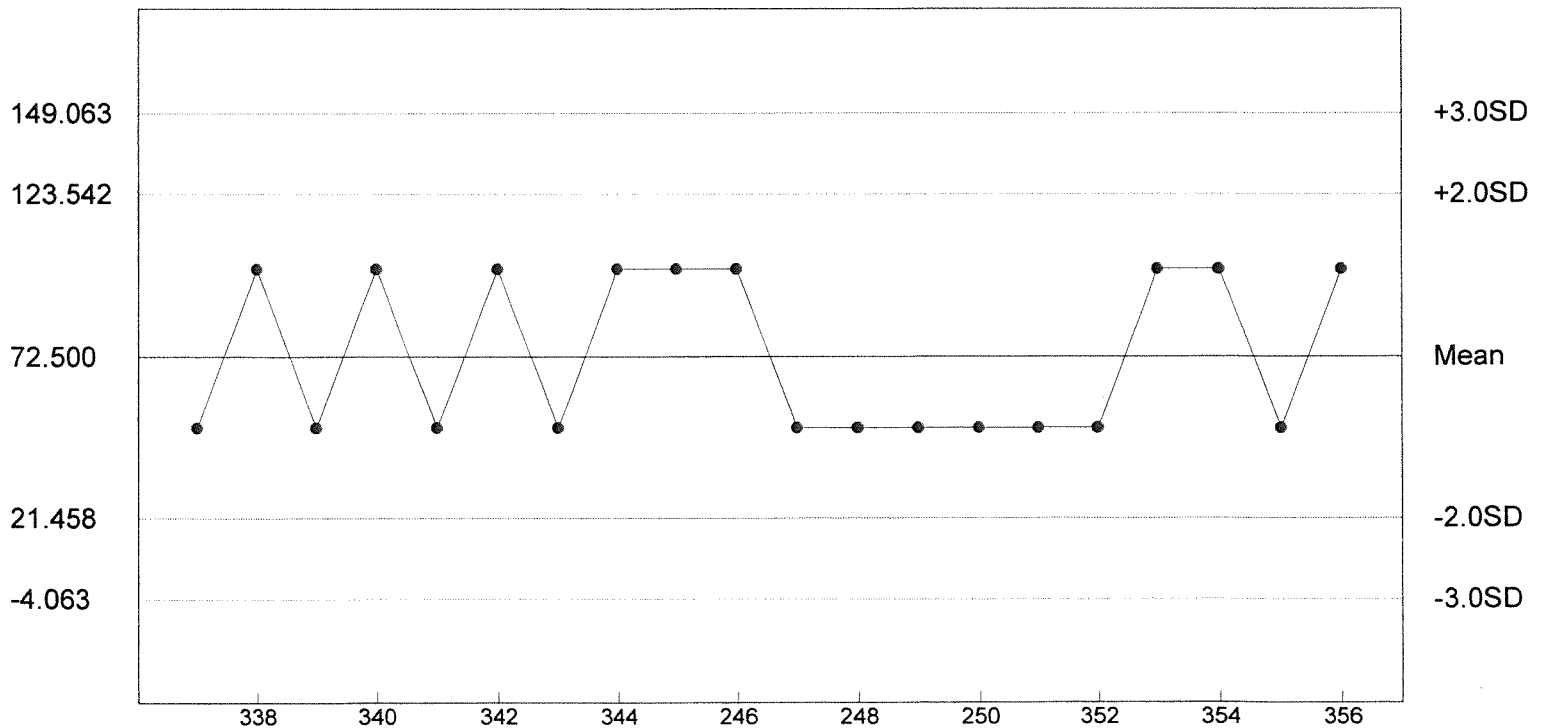
P. promelas Growth - NOEC



n= 20 Mean= 62.500 SD= 22.213 CV= 35.54% Min= 50.000 Max= 100.000

Reference Tox Copper Nitrate ug/L

P. promelas Chronic Survival - NOEC

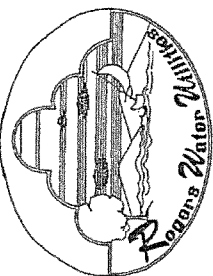


n= 20 Mean= 72.500 SD= 25.521 CV= 35.20% Min= 50.000 Max= 100.000

APPENDIX C
CHAIN OF CUSTODY SHEETS

34423

ROGERS POLLUTION CONTROL FACILITY

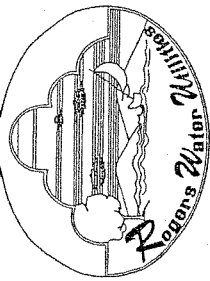


ROGERS POLLUTION CONTROL FACILITY
CHAIN OF CUSTODY

SAMPLE DESCRIPTION	SAMPLE ID	COLLECTION		CONTAINER L	TYPE C/G	METH A/M	TEMP °C
		DATE	TIME				
Effluent		On: 10/2/22 Off: 10/3/22	0830 0830	16	P	A	3.1
Influent		On: 10/2/22 Off: 10/3/22	0836 0836	8	P	A	3
		On: Off:					
		On: Off:					
		On: Off:					
		On: Off:					

ROGERS POLLUTION CONTROL FACILITY		ANALYSES														
Relinquished by:	Received by:	Time:	Date:	Relinquished by:	Received by:	Time:	Date:	Relinquished by:	Received by:	Time:	Date:	Relinquished by:	Received by:	Time:	Date:	
																T S S
<i>Green Vest</i>		0841	10/3/22													
COMMENTS:																
FedEx 3.0°C IRI																
SAMPLER(S):																
On: <i>Daryl C.</i> Off: <i>Green Vest</i>																
* Metals: Ag, As, Be, Cd, Cr, Cu, Mo, Ni, Pb, Sb, Se, Ti, Zn (preserved with HNO ₃)																
* WET: Whole Effluent Toxicity (Biomonitoring)																
* T T O 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&C preserved with H ₂ SO ₄ * CN preserved with NaOH * PHENOL preserved with CuSO ₄ + Phos Acid																

Matt Horner 10-4-22 1000



ROGERS POLLUTION CONTROL FACILITY CHAIN OF CUSTODY

ANALYSES

T S S	C B O D 3	N O 2 & N O 3	T P 4	O & G	P H E N O L S	M E T A L S	T T O
-------	-----------	---------------	-------	-------	---------------	-------------	-------

SAMPLE DESCRIPTION	SAMPLE ID	COLLECTION		CONTAINER L	TYPE C/G	METH A/M	TEMP °C
		DATE	TIME				
Effluent		On: 10/6/22 Off: 10/7/22	0830 0830	20	C	A	3.5
Influent		On: 10/6/22 Off: 10/7/22	0836 0836	8.5	C	A	3.7
		On:					
		Off:					
		On:					
		Off:					

Relinquished by: <i>John Velbert</i>	Received by:	Time: 0842	Date: 10/7/22	Relinquished by:	Received by:	Time:	Date:
Relinquished by:	<i>[Signature]</i>	Time: 1045	Date: 10-8-22	Relinquished by:	Received by:	Time:	Date:

COMMENTS: # 34423 FedEx FPI: 2.4

SAMPLER(S):
On: *John Velbert* Off: *John Velbert*

* Metals: Ag, As, Be, Cd, Cr, Cu, Mo, Ni, Pb, Sb, Se, Ti, Zn (preserved with HNO₃)
 * WET: Whole Effluent Toxicity (Biomonitoring).
 * LIO 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: 10/04/22**

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.	10.50%

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.	4.61%
22414 - 10	82%
22414 - PO	82%