

Bio-Analytical Laboratories' Executive Summary

Permittee: Magnolia Wastewater System
Columbia Road
Magnolia, AR

Project #: X8558

Outfall: 001 (treated domestic wastewater)

Permit #: AR0043613/ AFIN 14-00059

Contact: Tracie Love

Test Dates: November 28 – December 5, 2022

Test Type: Chronic Static Renewal Survival and Growth Test using *Pimephales promelas* (EPA Method 1000.0).

Results:

For *Pimephales promelas*:

1. If the NOEC for survival is less than the critical dilution (100.0%), enter a "1"; otherwise, enter a "0" for Parameter TLP6C - 0 (**Pass**).
2. If the NOEC for growth is less than the critical dilution (80.0%), enter a "1"; otherwise, enter a "0" for Parameter TGP6C- 0 (**Pass**).
3. Report the NOEC value for survival, Parameter TOP6C - 100.0%
4. Report the NOEC value for growth, Parameter TPP6C - 100.0%
5. Report the largest % coefficient of variation between the control and the critical dilution, Parameter TQP6C – 11.90%.
6. PMSD Biomass = 13.14% (12.0 – 30.0%)- moderate precision, acceptable for passing test

This report contains a total of 37 pages, including this page. The results in the report pertain only to the samples documented in the enclosed chain of custody documents and complies with the TNI (2009) and ADEQ standards. The chemical data in this report is for monitoring purposes only and should not be reported on discharge monitoring reports.



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THE RESULTS OF A CHRONIC DEFINITIVE TOXICITY TEST FOR OUTFALL 001

AT

**MAGNOLIA WASTEWATER SYSTEM
Magnolia, Arkansas**

**NPDES #AR0043613
AFIN: 14-00059**

EPA Method 1000.0

Project X8558

Test Dates: November 28 – December 5, 2022

Report Date: December 21, 2022

Prepared for:

Tracie Love
Magnolia Wastewater System
P.O. Box 666
Magnolia, AR 71753

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1.0 Introduction

Bio-Analytical Laboratories (BAL), Doyline, Louisiana conducted a chronic definitive toxicity test for Outfall 001 at the wastewater plant serving the city of Magnolia, Arkansas. The test organism used was the fathead minnow, *Pimephales promelas*. The purpose of this study is to determine if appropriately dilute effluent samples adversely affect the survival and growth of the test organism. Toxicity is defined as a statistically significant difference at the 95 percent confidence level between the survival and of the test organism in the critical dilution (the effluent concentration representative of the proportion of effluent in the receiving water during critical low flow or critical mixing conditions) compared to the survival and growth of the test organism in the control. The test endpoint is the No-Observed-Effect-Concentration (NOEC), the highest effluent concentration that is not significantly different from the control.

2.0 Methods and Materials

2.1 Test Methods

All methods followed were according to the latest edition of “Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms” (EPA-821-R-02-013), “Standard Methods for The Examination of Water and Wastewater” 22nd Edition (APHA 2012) and BAL’s standard operating procedure.

2.2 Test Organisms

The fathead minnows were raised in-house at test temperature and were less than 24 hours old at test initiation. Monthly chronic reference toxicant tests were conducted in order to document organism sensitivity and demonstration of capability.

2.3 Dilution Water

Soft reconstituted water, made per method guidelines, was used as the dilution water and the control for the test. Conductivity (SM 2510 B) and pH (SM 4500-H+ B) measurements, in umhos/cm and standard units, respectively, were checked on each lot of water prior to use to confirm water hardness.

2.4 Test Concentrations

The test concentrations used in the chronic toxicity tests were 100.0, 80.0, 56.0, 42.0 and 32.0 percent effluent and a control. The lethal and sub-lethal critical dilution was 100.0 and 80.0 percent effluent, respectively. The fathead minnow test was conducted using five replicates of eight animals each for a total of 40 animals per concentration.

2.5 Sample Collection

Three composite samples of Outfall 001 were collected by city personnel on November 28, 30 and December 2, 2022, at 0800 hours. Upon collection and completion of each composite, the samples were packed in ice and delivered the same day to the laboratory by hotshot service. The temperature upon arrival each of the effluent samples was 5.6, 1.5 and 2.0⁰ Celsius, respectively.

2.6 Sample Preparation

Upon arrival, the samples were logged in, given an identification number, and refrigerated unless needed. Prior to use, the samples were warmed to 25±1⁰ Celsius. Total residual chlorine levels were measured in milligrams/Liter (mg/L) with a test strip and recorded if present. Total ammonia levels were measured in mg/L using a test strip. In the minnow test, each sample was treated with an 18-watt ultraviolet light (UV) at a rate of 113 ml/minute, with an extra 100 percent dilution set up with the treated portion. This was to document any toxicity that may be due to pathogen interference. Dissolved oxygen (4500-O G) and pH (4500-H+ B) measurements were measured in mg/L and standard units, respectively, on the control and each concentration at test initiation, at test renewal and at test termination. Conductivity (2510 B) measurements in umhos/cm were also taken at test initiation and at each renewal. Alkalinity (2320 B) and hardness (2340 C) levels were measured in mg/L as CaCO₃ on the control and the undiluted effluent samples.

2.7 Monitoring of the Test

The fathead minnow test was run in a circulating waterbath, using a Remcor^R heated liquid circulator to keep a constant temperature of 25±1⁰ Celsius. A data-logger was used to monitor diurnal test temperature. Test temperature was recorded at the beginning of the day, after test renewal and at the end of the day. Light cycle and intensity were recorded twice a month.

2.8 Data Analysis

Survival data was analyzed using Steel's Many-One Rank Test, a nonparametric test comparing concentration data to control data. Growth (biomass) data was analyzed using Dunnett's Test, a parametric test comparing concentration data to control data. Other test endpoints were obtained by approved EPA methods of analysis.

3.0 Results and Discussion

The fathead minnow test results can be found in Table 1. After seven days of exposure, 100.0 percent survival occurred in the control and 95.0 percent survival occurred in the 100.0 percent critical dilution. The average weight gained per minnow in the control and in the 80.0 percent critical dilution was 0.820 and 0.690 milligram (mg), respectively. The NOEC for survival and growth in this test was 100.0 percent effluent (p=.05).

Table 1: Results of the Chronic Definitive Fathead Minnow Test

Percent Effluent	Percent Survival	Sig.*	Mean Dry Weight (mg)	Sig.*
Control	100.0		0.820	
32.0	100.0		0.760	
42.0	100.0		0.710	
56.0	98.0		0.720	
80.0	95.0		0.690	
100.0	95.0		0.730	
100.0 UV	98.0		0.760	

*significant when compared to the control (p=.05). +Test validity based on mean dry weight per surviving larvae in the control. NOEC value based on mean dry weight per the number of larvae at the start of the test.

The monthly chronic reference toxicant tests demonstrated that the test organisms were within the acceptable sensitivity levels. The graphs of the results of the chronic reference toxicant tests can be found in Appendix D- Quality Assurance Charts.

4.0 Conclusions

The three composite samples of Outfall 001 collected from the wastewater plant serving the city of Magnolia, Arkansas, on November 28, 30 and December 2, 2022, were not found to be lethally toxic to the *Pimephales promelas* test organisms in the 100.0 percent critical dilution after seven days exposure (p=.05). Sublethal effects (i.e., low growth) were not noted in the test (p=.05).

5.0 References

- EPA, 2002. Short-Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms. Fourth Edition. EPA-821-R-02-013, Office of Water.
- EPA, 2000. Understanding and Accounting for Method Variability in Whole Effluent Toxicity Applications Under the National Pollutant Discharge Elimination System. EPA-833-R-00-003, Office of Wastewater Management.
- EPA, 2000. Method Guidance and Recommendations for Whole Effluent (WET) Testing. EPA-821-B-00-04, Office of Water
- APHA, 2012. Standard Methods for The Examination of Water and Wastewater. 22nd Edition.

APPENDIX A
CHAIN-OF-CUSTODY DOCUMENTS

NELAP/LELAP 01975, ADEQ 88-0630, TCEQ T104704278



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Laboratory Use Only:

Company: City of Magnolia		Phone: (870) 234-2955		Project Number: X8558	
Address: P.O. Box 666, Magnolia, AR 71753		Fax: (870) 234-2203		Temp. upon arrival: 56 Therm #: 27	
Permit #: AR0043613/AFIN 14-00059		Purchase Order:		Color: clear Odor: None Tech: <i>dr</i>	
Sampler's Signature/Printed Name/Affiliation: <i>Shirley Love (MWS)</i>		Sample Identification		Preservative: (below) ICE	
Date Start Date End	Time Start Time End	C	G	# and type of container	Lab Control Number:
11/27/22 11/28/22	500- 300	X		8 half gallons	024010
Relinquished by/Affiliation: <i>Shirley Love (MWS)</i>		Date: 11/28/22	Time: 9:01A	Received by/Affiliation: <i>Steve Lee</i>	Date: 11/28/22
Relinquished by/Affiliation: <i>Steve Lee</i>		Date: 11/28/22	Time: 1:43P	Received by/Affiliation:	Date:
Relinquished by/Affiliation:		Date:	Time:	Received by/Affiliation: <i>Alexis Mitchell</i>	Date: 11/28/22
Method of Shipment:		Lab	Bus	Fed Ex	DHL
Comments:		UPS	Client	Other	Tracking #
COC Rev.3.1					

NELAP/LELAP 01975, ADEQ 88-0630, TCEQ T104704278



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Laboratory Use Only:






Company: City of Magnolia		Phone: (870) 234-2955		Project Number: X 6558	
Address: P.O. Box 666, Magnolia, AR 71753		Fax: (870) 234-2203		Temp. upon arrival: 11.5 °C Therm #: 29	
Permit #: AR0043613/AFIN 14-00059		Purchase Order:		Color: Clear Odor: None Tech: EGN	
Sampler's Signature/Printed Name/Affiliation: <i>Travis Love / mwws</i>		Lab Control Number: C24029		Preservative: (below) ICE	
Date Start Date End	Time Start Time End	C	G	# and type of container	Sample Identification
11/29/22 11/30/22	800 - 800	X		8 half gallons	001
Relinquished by/Affiliation: <i>Travis Love / mwws</i>		Received by/Affiliation: <i>Travis Love</i>		Date: 11/30/22	Time: 8:50A
Relinquished by/Affiliation: <i>Travis Love</i>		Received by/Affiliation: <i>Travis Love</i>		Date: 11/30/22	Time: 1:33P
Relinquished by/Affiliation:		Received by/Affiliation:		Date:	Time:
Method of Shipment: Lab		Bus	Fed Ex	DHL	UPS
Comments:		Client	Other	Tracking #	
COC Rev.3.1					

NELAP/LELAP 01975, ADEQ 88-0630, TCEQ TI04704278



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Laboratory Use Only:

Company: City of Magnolia		Phone: (870) 234-2955		Project Number: X8558	
Address: P.O. Box 666, Magnolia, AR 71753		Fax: (870) 234-2203		Temp. upon arrival: 2.0 Therm #: 29	
Permit #: AR0043613/AFIN 14-00059		Purchase Order:		Color: clear	
Sampler's Signature/Printed Name/Affiliation:  Travis Love / MWWS		Lab Control Number: C24036		Odor: none	
Date Start / Date End 12/1/22 - 12/2/22		Time Start / Time End 800 - 800		Tech: JM	
Date 12/1/22		G X		Preservative: (below)	
Sample Identification 001		# and type of container 8 half gallons		ICE	
Relinquished by/Affiliation:  Travis Love / MWWS		Received by/Affiliation:  Travis Love		Date: 12/2/22 Time: 8:39A	
Relinquished by/Affiliation:  Travis Love		Received by/Affiliation:  Alexis Mitchell		Date: 12/2/22 Time: 1:38P	
Relinquished by/Affiliation:		Received by/Affiliation:		Date: 12/2/22 Time: 1358	
Method of Shipment:		Lab		Client	
Comments:		UPS		Tracking #	
COC Rev.3.1		DHL		Other	

**APPENDIX B
RAW DATA SHEETS**

BIO-ANALYTICAL LABORATORIES
 PIMEPHALES PROMELAS SURVIVAL AND GROWTH DATA SHEET

Project# X8558 Date started: 11/28/21 Date ended 12/5/22

Client/Contact MAGN/Magnolia Waste Water
 Address P.O. Box 666 Magnolia AR 71753
 NPDES# AR0043613 AFIN14-00059
 Sample Description 001 Dilution Water Soft Reconstituted
 Test Temperature (°C) 25+1° Celsius Technicians EGB/EDW/AM/PM
 Test organism age <24hrs Vendor/ID# BAL 112822A

Feeding Times

Day	Technician/Time/Amount (per replicate)		
	AM	NOON	PM
0			AM 1750 0.2ml
1	EDW 10840 0.10ml	EDW 11230 0.10ml	PM 11715 0.1ml
2	PM 10845 0.1ml	EDW 11330 0.10ml	AM 11805 0.1ml
3	PM 10820 0.1ml	AM 11320 0.1ml	AM 11815 0.1ml
4	PM 10825 0.1ml	AM 11400 0.1ml	PM 11835 0.1ml
5	PM 1185 * 1145 0.2ml		AM 11735 0.2ml
6	PM 10920 0.2ml		AM 11730 0.2ml

Dissolved Oxygen Meter: Model YSI550 Serial #02F0741 AH
 pH Meter: Model Orion 230A+ Serial #015253
 Conductivity Meter: Model YSI EC300A Serial #JC02714

Effluent Initial DO (mg/L & %)/Tech	Aerate?/Minutes /Final DO (mg/L & %)/Tech	Receiving Water Initial DO (mg/L & %)/Tech	Aerate?/Minutes /Final DO (mg/L & %)/Tech
0. 7.7/98.9% / EDW	0. NO / EDW	0. _____	0. _____
1. 8.9/102.5% / EDW	1. 12/8.2/98.3% / EDW	1. _____	1. _____
2. 8.7/104.1% / AM	2. 16/8.3/99.9% / AM	2. _____	2. _____
3. 8.5/99.2% / PM	3. 18/8.1/94.2% / PM	3. _____	3. _____
4. 8.9/100.2% / AM	4. NO / AM	4. _____	4. _____
5. 9.4/108.3% / AM	5. 12/8.1/99.4% / AM	5. _____	5. _____
6. 9.5/100.2% / AM	6. NO / AM	6. _____	6. _____

Total Residual Chlorine (mg/L)/Tech	Dechlorinated? Amount?/Tech	Ammonia (NH3) (mg/L)/Tech	BAL Sample # Date in use
1. <0.5 / EDW	1. NO / EDW	1. <0.5 / EDW	1. C24010 11/28/22
2. <0.5 / PM	2. NO / PM	2. 0 / PM	2. C24029 12/11/22
3. <0.5 / AM	3. NO / AM	3. <0.5 / AM	3. C24036 12/31/22

Comments: * AM 12/11/22

Day 3: 8.9/105.1% / AM

PM under supervision of staff EGB 12/10/22

BIO-ANALYTICAL LABORATORIES 7-DAY CHRONIC MINNOW SURVIVAL DATA - EPA 1000, OECD 210

Project# X8558

Test started: Date 11/28/12 Time 735

Client Magnolia

Sample ID 001

Test ended: Date 12/15/12 Time 1630

Date/Tech: Day0 11/28/12 M1 11/29/12 M2 11/30/12 M3 12/1/12 M4 12/2/12 M5 12/3/12 M6 12/4/12 M7 12/5/12 M8 12/6/12 M9 12/7/12
 Time: Day0 1735 1 1750 2 1826 3 1915 4 1945 5 1600 6 1650 7 1630
 Temp (°C) Day0 23.1 1 24.0 2 24.4 3 24.5 4 24.3 5 23.8 6 24.3 7 24.6

Conc %	Rep.	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
0	1	8	8	8	8	8	8	8	8
	2	8	8	8	8	8	8	8	8
	3	8	8	8	8	8	8	8	8
	4	8	8	8	8	8	8	8	8
	5	8	8	8	8	8	8	8	8
32.0	1	8	8	8	8	8	8	8	8
	2	8	8	8	8	8	8	8	8
	3	8	8	8	8	8	8	8	8
	4	8	8	8	8	8	8	8	8
	5	8	8	8	8	8	8	8	8
42.0	1	8	8	8	8	8	8	8	8
	2	8	8	8	8	8	8	8	8
	3	8	8	8	8	8	8	8	8
	4	8	8	8	8	8	8	8	8
	5	8	8	8	8	8	8	8	8
56.0	1	8	8	8	8	8	8	8	8
	2	8	8	8	8	8	8	8	7
	3	8	8	8	8	8	8	8	8
	4	8	8	8	8	8	8	8	8
	5	8	8	8	8	8	8	7	7
70.0	1	8	8	8	8	8	8	8	8
	2	8	8	8	8	7	7	7	7
	3	8	8	8	8	8	8	8	8
	4	8	8	8	8	8	8	7	7
	5	8	8	8	8	8	8	8	8
100.0	1	8	8	8	8	8	8	8	8
	2	8	8	8	8	8	8	7	7
	3	8	8	8	8	7	7	7	7
	4	8	8	8	8	8	7	7	7
	5	8	8	8	8	8	8	8	8

BIO-ANALYTICAL LABORATORIES 7-DAY CHRONIC MINNOW SURVIVAL DATA- EPA 1000, OECD 210

Project# X8558 Test started: Date 11/28 Time 1735 @ 8:15 AM
 Client Magnolia Sample ID 001 Test ended: Date 12/5 Time 1630
 Date/Tech: Day 0 11/28/22 AM 11:11 1 11/29/22 AM 11:50 2 11/30/22 12:11 3 12/1/22 PM 12:12 4 12/2/22 PM 12:42 5 12/3/22 AM 12:42 6 12/4/22 PM 12:52 7 12/5/22
 Time: Day 0 1735 1 1150 2 1226 3 1415 4 1745 5 1600 6 1650 7 1630
 Temp (°C) Day 0 23.1 1 21.0 2 24.4 3 24.6 4 24.3 5 23.8 6 24.3 7 24.6

Conc. %	Rep.	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7
100.0 UV	1	8	8	8	8	8	8	8	8
	2	8	8	8	8	8	8	8	8
	3	8	8	8	8	8	8	8	8
	4	8	8	8	8	8	8	8	8
	5	8	8	7	7	7	7	7	7
	1								
	2								
	3								
	4								
	5								
	1								
	2								
	3								
	4								
	5								
	1								
	2								
	3								
	4								
	5								

Project#/Client X8558 Magnolia Temp Start (°C) 10.3 Tech EDM Date: 12/15/27 Time: 1635
Temp End (°C) 10.6 Tech EDM Date: 12/16/27 Time: 1000

Conc.	Replicate/ Pan number	Wt. of pan(g)/ Date weighed: <u>11/29/22</u> Tech: <u>LEM</u>	Wt. of pan + larvae(g)/ Date weighed: <u>12/9/22</u> Tech: <u>EDM</u>	Total wt. of larvae (g)	Original # of larvae at test initiation	Mean Dry wt. of larvae (mg)	Mean Dry wt. - surviving larvae (mg) Control Only*
9	1 126	1.0233	1.0300				
	2 127	1.0289	1.0359				
	3 128	1.0252	1.0319				
	4 129	1.0267	1.0336				
	5 130	1.0290	1.0345				
05	1 131	1.0507	1.0573				
	2 132	1.0293	1.0354				
	3 133	1.0406	1.0466				
	4 134	1.0425	1.0478				
	5 135	1.0437	1.0499				
32	1 136	1.0324	1.0388				
	2 137	1.0340	1.0398				
	3 138	1.0269	1.0327				
	4 139	1.0373	1.0423				
	5 140	1.0370	1.0424				
42	1 141	1.0350	1.0413				
	2 142	1.0479	1.0536				
	3 143	1.0361	1.0424				
	4 144	1.0460	1.0514				
	5 145	1.0251	1.0301				
56	1 146	1.0476	1.0528				
	2 147	1.0295	1.0347				
	3 148	1.0350	1.0406				
	4 149	1.0308	1.0362				
	5 150	1.0335	1.0398				
80	1 151	1.0410	1.0476				
	2 152	1.0336	1.0386				
	3 153	1.0305	1.0359				
	4 154	1.0456	1.0513				
	5 155	1.0453	1.0518				
100							

* Test acceptance of control weight based on surviving larvae at end of test.

Calculated by: GETTS Calculations checked by: EGB 12/12/27

BIO-ANALYTICAL LABORATORIES MINNOW LARVAL GROWTH DATA SHEET (Minnow3 Rev 2) 17 of 37

Project#/Client X8558 Magnolia Temp Start (°C) 63.0 Tech EM Date: 12/5 Time: 1635
Temp End (°C) 106 Tech EM Date: 12/6 Time: 1000

Conc. %	Replicate/ Pan number	Wt. of pan(g)/ Date weighed: <u>11/29/22</u> Tech: <u>EM</u>	Wt. of pan + larvae(g)/ Date weighed: <u>12/8/22</u> Tech: <u>EM</u>	Total wt. of larvae (g)	Original # of larvae at test initiation	Mean Dry wt. of larvae (mg)	Mean Dry wt. - surviving larvae (mg) Control Only*
100 UV	1156	1.04103	1.0525				
	2157	1.0371	1.0429				
	3158	1.0265	1.0320				
	4159	1.0389	1.0460				
	5160	1.0341	1.0401				
	1						
	2						
	3						
	4						
	5						
	1						
	2						
	3						
	4						
	5						
	1						
	2						
	3						
	4						
	5						
	1						
	2						
	3						
	4						
	5						

* Test acceptance of control weight based on surviving larvae at end of test.

Calculated by: CETLS Calculations checked by: EGP 12/12/22

BIO-ANALYTICAL LABORATORIES CHRONIC WATER QUALITY DATA (CHR CHEM Rev.4.0)

Project# X8558 Client City of Magnolia Organism P. promelas

Date	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
	11/20/22 5287	11/21/22	11/30/22	12/1/22	12/12/22	12/31/22	12/14/22	12/15/22	
Concentration:	0 soft 8287								
Temperature (°C)	26.9	24.1 20.9	24.7	25.0	24.5	23.9	24.6	24.1	
pH	7.8	6.8 7.3	6.7	7.0	6.3	6.2	6.1	7.1	
DO (mg/L)	7.6	7.1 7.5	5.6	6.5	9.0	6.0	5.5	6.3	
Cond (umhos/cm)	164	1105	182	197	175	171	163		
Concentration:	32.0%								
Temperature (°C)	26.7	24.1 20.5	24.7	24.9	24.5	23.8	24.6	23.7	
pH	7.5	6.8 7.5	6.8	7.2	6.2	6.0	6.0	6.9	
DO (mg/L)	7.8	6.0 7.5	4.8	7.0	4.4	5.5	4.9	7.0	
Cond (umhos/cm)	201	254	216	235	217	236	223		
Concentration:	42.0%								
Temperature (°C)	26.6	24.1 20.4	24.8	24.3	24.3	23.8	24.7	24.1	
pH	7.5	6.8 7.7	6.9	7.3	6.3	6.2	6.0	7.0	
DO (mg/L)	7.8	6.0 7.5	5.0	7.0	4.1	5.3	4.6	6.2	
Cond (umhos/cm)	206	283	224	256	231	258	263		
Prerenewal Tech Initials/Time		PCM 1155	1230 AM	EDV 1415	1745 PM	1105 PM	1655 PM	EDV 1630	
Postrenewal Tech Initials/Time	1515 AM	1217 1020	1017 AM	1140 AM	0855 AM	1118 AM	1043 AM		

Control Alkalinity (mg/L as CaCO₃)

Control Hardness (mg/L as CaCO₃)

ID# 5282 Result 28.0 Date Tested 12/1/22 ID# 5282 Result 48.0 Date Tested 12/1/22
 ID# 5287 Result 52.0 Date Tested 12/18/22 ID# 5287 Result 5.2 Date Tested 12/18/22
 ID# _____ Result _____ Date Tested _____ ID# _____ Result _____ Date Tested _____

Sample Alkalinity (mg/L as CaCO₃)

Sample Hardness (mg/L as CaCO₃)

ID# C24010 Result 72.0 Date Tested 12/1/22 ID# C24010 Result 52.0 Date Tested 12/1/22
 ID# C24029 Result 80.0 Date Tested 12/1/22 ID# C24029 Result 40.0 Date Tested 12/1/22
 ID# C24036 Result 80 Date Tested 12/18/22 ID# C24036 Result 28 Date Tested 12/18/22

BIO-ANALYTICAL LABORATORIES CHRONIC WATER QUALITY DATA (CHR CHEM Rev.4.0)

Project# X8558 client City of Magnolia Organism P. promelas

Date	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
Concentration: <u>56.0%</u>									
Temperature (°C)	26.2	24.2	24.7	24.1	24.4	23.8	24.6	23.9	
pH	7.5	10.8	7.6	7.3	6.4	6.3	6.2	6.9	
DO (mg/L)	7.7	5.9	4.9	5.0	4.0	5.0	4.3	6.2	
Cond (umhos/cm)	217	7.5	7.2	7.6	8.1	7.9	8.2		
Concentration: <u>80.0%</u>									
Temperature (°C)	26.0	24.1	24.7	23.9	24.4	23.8	24.6	24.2	
pH	7.5	10.9	7.0	7.2	6.5	6.4	6.3	6.9	
DO (mg/L)	7.8	5.7	4.9	5.9	3.9	4.8	4.2	6.2	
Cond (umhos/cm)	242	7.7	7.5	7.8	8.4	8.3	8.2		
Concentration: <u>100.0%</u>									
Temperature (°C)	26.0	24.1	24.6	24.1	24.4	23.8	24.5	24.3	
pH	7.4	10.9	7.0	7.3	6.6	6.3	6.4	6.1	
DO (mg/L)	7.9	5.10	5.0	8.9	3.9	4.6	4.1	6.0	
Cond (umhos/cm)	254	7.8	7.2	7.9	8.6	8.5	8.4		
Prerenewal Tech Initials/Time		ERM 1155	1230 AM	ERM 1415	1745 PM	1605 PM	1655 PM	ERM 1630	
Postrenewal Tech Initials/Time	ERM 1515	ERM 1020	1017 AM	1140 AM	0855 AM	1118 AM	1043 AM		

Control Alkalinity (mg/L as CaCO₃)

Control Hardness (mg/L as CaCO₃)

ID# _____ Result _____ Date Tested _____
 ID# _____ Result _____ Date Tested _____
 ID# _____ Result _____ Date Tested _____

ID# _____ Result _____ Date Tested _____
 ID# _____ Result _____ Date Tested _____
 ID# _____ Result _____ Date Tested _____

Sample Alkalinity (mg/L as CaCO₃)

Sample Hardness (mg/L as CaCO₃)

ID# _____ Result _____ Date Tested _____
 ID# _____ Result _____ Date Tested _____
 ID# _____ Result _____ Date Tested _____

ID# _____ Result _____ Date Tested _____
 ID# _____ Result _____ Date Tested _____
 ID# _____ Result _____ Date Tested _____

BIO-ANALYTICAL LABORATORIES CHRONIC WATER QUALITY DATA (CHR CHEM Rev.4.0)

Project# X8558 Client City of Magnolia Organism P. promelas

Date	Day 0	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Day 8
	11/28/22	11/29/22	11/30/22	12/1/22	12/2/22	12/3/22	12/4/22		
Concentration:	100.0% UV								
Temperature (°C)	26.0	23.9	24.6	23.9	24.5	23	21.4	23.5	
pH	7.4	7.0	7.1	7.2	6.6	6.6	6.5	6.9	
DO (mg/l)	7.7	5.9	5.3	6.1	4.1	4.3	4.5	6.0	
Cond (umhos/cm)	263	275	280	343	304	376	344		
Concentration:									
Temperature (°C)									
pH									
DO (mg/l)									
Cond (umhos/cm)									
Concentration:									
Temperature (°C)									
pH									
DO (mg/l)									
Cond (umhos/cm)									
Prerenewal Tech Initials/Time		EDW 1155	1230 AM	EDW 1415	1745 PM	1605 PM	1655 PM	EDW 1635	
Postrenewal Tech Initials/Time	EDW 1515	1211 1020 AM	1017 AM	1140 AM	0855 AM	1118 AM	1043 AM		

Control Alkalinity (mg/L as CaCO₃)

Control Hardness (mg/L as CaCO₃)

ID# _____ Result _____ Date Tested _____
 ID# _____ Result _____ Date Tested _____
 ID# _____ Result _____ Date Tested _____

ID# _____ Result _____ Date Tested _____
 ID# _____ Result _____ Date Tested _____
 ID# _____ Result _____ Date Tested _____

Sample Alkalinity (mg/L as CaCO₃)

Sample Hardness (mg/L as CaCO₃)

ID# _____ Result _____ Date Tested _____
 ID# _____ Result _____ Date Tested _____
 ID# _____ Result _____ Date Tested _____

ID# _____ Result _____ Date Tested _____
 ID# _____ Result _____ Date Tested _____
 ID# _____ Result _____ Date Tested _____

CETIS Test Data Worksheet

Report Date: 26 Nov-22 09:41 (p 1 of 1)
 Test Code/ID: 775B4EDB / 20-0247-2667

Fathead Minnow 7-d Larval Survival and Growth Test Bio-Analytical Laboratories

Start Date: 29 Nov-22 15:40 Species: Pimephales promelas Sample Code: 21F84618
 End Date: 06 Dec-22 15:36 Protocol: EPA/821/R-02-013 (2002) Sample Source: AR0043613
 Sample Date: 28 Nov-22 08:00 Material: POTW Effluent Sample Station: 001

Conc-%	Code	Rep	Pos	# Exposed	1d Survival	2d Survival	3d Survival	4d Survival	5d Survival	6d Survival	7d Survival	Td Weig
56		3	1									
UV 101		2	2									
UV 101	.	4	3									
42	.	3	4									
100	.	4	5									
80	.	5	6									
0	D	5	7									
56	.	2	8									
100	.	1	9									
80	.	1	10									
100	.	3	11									
80	.	4	12									
42	.	1	13									
56	.	4	14									
80	.	3	15									
32	.	2	16									
80	.	2	17									
UV 101	.	3	18									
42	.	5	19									
UV 101	.	1	20									
32	.	5	21									
0	D	3	22									
100	.	5	23									
56	.	5	24									
0	D	4	25									
UV 101	.	5	26									
32	.	3	27									
32	.	1	28									
32	.	4	29									
56	.	1	30									
100	.	2	31									
0	D	1	32									
42	.	2	33									
0	D	2	34									
42	.	4	35									

APPENDIX C
STATISTICAL ANALYSIS

CETIS Analytical Report

Report Date: 09 Dec-22 12:43 (p 1 of 2)
Test Code/ID: 775B4EDB / 20-0247-2667

Fathead Minnow 7-d Larval Survival and Growth Test

Bio-Analytical Laboratories

Analysis ID: 04-5419-9550	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.9.7
Analyzed: 09 Dec-22 12:43	Analysis: Nonparametric-Control vs Treatments	Status Level: 1
Edit Date: 09 Dec-22 12:38	MD5 Hash: 4BDDFD6242A96477EAE2B1A5BD6B52F	Editor ID: 008-522-314-5
Batch ID: 14-0282-4454	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 28 Nov-22 17:35	Protocol: EPA/821/R-02-013 (2002)	Diluent: Reconstituted Water
Ending Date: 05 Dec-22 16:30	Species: Pimephales promelas	Brine:
Test Length: 6d 23h	Taxon: Actinopterygii	Source: In-House Culture Age: <24
Sample ID: 05-6991-9000	Code: X8558	Project: WET Quarterly Compliance Test (4Q)
Sample Date: 28 Nov-22 08:00	Material: POTW Effluent	Source: AR0043613
Receipt Date: 28 Nov-22 13:43	CAS (PC):	Station: 001
Sample Age: 10h (5.6 °C)	Client: Magnolia Wastewater System	

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	MSDu	PMSD
Angular (Corrected)	C > T	101	>101	---	0.9901	0.078	7.82%

Steel Many-One Rank Sum Test

Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water		32	28	16	1	8	CDF	0.8571	Non-Significant Effect
		42	28	16	1	8	CDF	0.8571	Non-Significant Effect
		56	25	16	1	8	CDF	0.6693	Non-Significant Effect
		80	22	16	1	8	CDF	0.4265	Non-Significant Effect
		100	22	16	1	8	CDF	0.4265	Non-Significant Effect
		101	25	16	1	8	CDF	0.6693	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits		Overlap	Decision
		Lower	Upper		
Control Resp	1	0.8	>>	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.032766	0.005461	6	1.1	0.3691	Non-Significant Effect
Error	0.134919	0.0048185	28			
Total	0.167685		34			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test				Indeterminate
Distribution	Shapiro-Wilk W Normality Test	0.81	0.91	3.4E-05	Non-Normal Distribution

7d Survival Rate Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00%	0.00%
32		5	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00%	0.00%
42		5	1.00	1.00	1.00	1.00	1.00	1.00	0.00	0.00%	0.00%
56		5	0.98	0.91	1.00	1.00	0.88	1.00	0.03	5.73%	2.50%
80		5	0.95	0.86	1.00	1.00	0.88	1.00	0.03	7.21%	5.00%
100		5	0.95	0.86	1.00	1.00	0.88	1.00	0.03	7.21%	5.00%
101		5	0.98	0.91	1.00	1.00	0.88	1.00	0.03	5.73%	2.50%

Angular (Corrected) Transformed Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.40	1.40	1.40	1.40	1.40	1.40	0.00	0.00%	0.00%
32		5	1.40	1.40	1.40	1.40	1.40	1.40	0.00	0.00%	0.00%
42		5	1.40	1.40	1.40	1.40	1.40	1.40	0.00	0.00%	0.00%
56		5	1.40	1.30	1.50	1.40	1.20	1.40	0.04	6.06%	2.64%
80		5	1.30	1.20	1.40	1.40	1.20	1.40	0.05	7.62%	5.27%
100		5	1.30	1.20	1.40	1.40	1.20	1.40	0.05	7.62%	5.27%
101		5	1.40	1.30	1.50	1.40	1.20	1.40	0.04	6.06%	2.64%

CETIS Analytical Report

Report Date: 09 Dec-22 12:43 (p 2 of 2)
Test Code/ID: 775B4EDB / 20-0247-2667

Fathead Minnow 7-d Larval Survival and Growth Test

Bio-Analytical Laboratories

Analysis ID: 04-5419-9550 Endpoint: 7d Survival Rate CETIS Version: CETISv1.9.7
Analyzed: 09 Dec-22 12:43 Analysis: Nonparametric-Control vs Treatments Status Level: 1
Edit Date: 09 Dec-22 12:38 MD5 Hash: 4BDDFD6242A96477EAE2B1A5BD6B52F Editor ID: 008-522-314-5

7d Survival Rate Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.00	1.00	1.00	1.00	1.00
32		1.00	1.00	1.00	1.00	1.00
42		1.00	1.00	1.00	1.00	1.00
56		1.00	1.00	1.00	1.00	0.88
80		1.00	0.88	1.00	0.88	1.00
100		1.00	0.88	0.88	1.00	1.00
101 100 UV		1.00	1.00	1.00	1.00	0.88

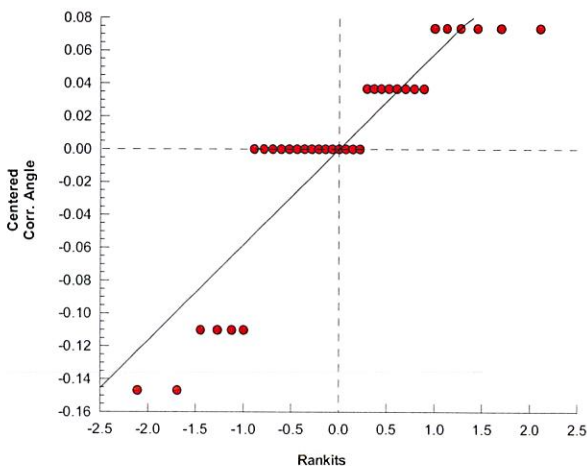
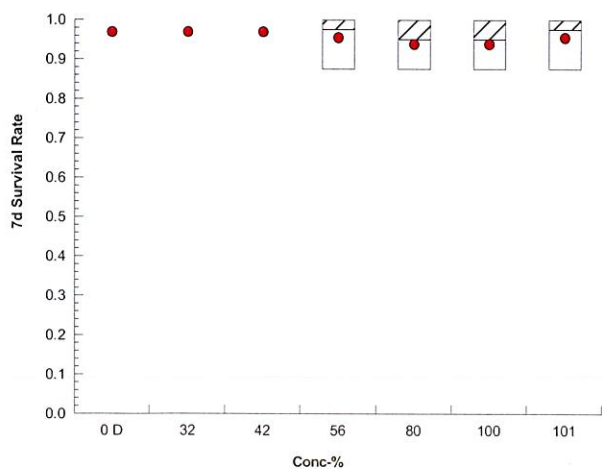
Angular (Corrected) Transformed Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.40	1.40	1.40	1.40	1.40
32		1.40	1.40	1.40	1.40	1.40
42		1.40	1.40	1.40	1.40	1.40
56		1.40	1.40	1.40	1.40	1.20
80		1.40	1.20	1.40	1.20	1.40
100		1.40	1.20	1.20	1.40	1.40
101 100 UV		1.40	1.40	1.40	1.40	1.20

7d Survival Rate Binomials

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	8/8	8/8	8/8	8/8	8/8
32		8/8	8/8	8/8	8/8	8/8
42		8/8	8/8	8/8	8/8	8/8
56		8/8	8/8	8/8	8/8	7/8
80		8/8	7/8	8/8	7/8	8/8
100		8/8	7/8	7/8	8/8	8/8
101 100 UV		8/8	8/8	8/8	8/8	7/8

Graphics



QA: 12/12/22

CETIS Analytical Report

Report Date: 09 Dec-22 12:47 (p 1 of 2)
Test Code/ID: 775B4EDB / 20-0247-2667

Fathead Minnow 7-d Larval Survival and Growth Test

Bio-Analytical Laboratories

Analysis ID: 10-8698-3900	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.9.7
Analyzed: 09 Dec-22 12:46	Analysis: Parametric-Control vs Treatments	Status Level: 1
Edit Date: 09 Dec-22 12:43	MD5 Hash: 6FDF3957F4FF6915F285E5D2559C5720	Editor ID: 008-522-314-5
Batch ID: 14-0282-4454	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 28 Nov-22 17:35	Protocol: EPA/821/R-02-013 (2002)	Diluent: Reconstituted Water
Ending Date: 05 Dec-22 16:30	Species: Pimephales promelas	Brine:
Test Length: 6d 23h	Taxon: Actinopterygii	Source: In-House Culture Age: <24
Sample ID: 05-6991-9000	Code: X8558	Project: WET Quarterly Compliance Test (4Q)
Sample Date: 28 Nov-22 08:00	Material: POTW Effluent	Source: AR0043613
Receipt Date: 28 Nov-22 13:43	CAS (PC):	Station: 001
Sample Age: 10h (5.6 °C)	Client: Magnolia Wastewater System	

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	MSDU	PMSD
Untransformed	C > T	101	>101	---	0.9901	0.11	13.14%

Dunnett Multiple Comparison Test

Control	vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water		32	1.5	2.4	0.11	8	CDF	0.2627	Non-Significant Effect
		42*	2.5	2.4	0.11	8	CDF	0.0451	Significant Effect
		56	2.3	2.4	0.11	8	CDF	0.0634	Non-Significant Effect
		80*	2.8	2.4	0.11	8	CDF	0.0192	Significant Effect
		100	2	2.4	0.11	8	CDF	0.1075	Non-Significant Effect
		101	1.2	2.4	0.11	8	CDF	0.3508	Non-Significant Effect

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits			Decision
		Lower	Upper	Overlap	
Control Resp	0.82	0.25	>>	Yes	Passes Criteria
PMSD	0.13	0.12	0.3	Yes	Passes Criteria

ANOVA Table

Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0549935	0.0091656	6	1.8	0.1293	Non-Significant Effect
Error	0.140252	0.005009	28			
Total	0.195245		34			

ANOVA Assumptions Tests

Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)
Variance	Bartlett Equality of Variance Test	0.98	17	0.9863	Equal Variances
Distribution	Shapiro-Wilk W Normality Test	0.98	0.91	0.6617	Normal Distribution

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.82	0.73	0.91	0.84	0.69	0.88	0.034	9.25%	0.00%
32		5	0.76	0.68	0.83	0.76	0.66	0.83	0.026	7.82%	7.93%
42		5	0.71	0.63	0.79	0.72	0.62	0.8	0.029	9.18%	13.41%
56		5	0.72	0.63	0.81	0.71	0.62	0.79	0.032	9.90%	12.50%
80		5	0.69	0.62	0.76	0.67	0.65	0.79	0.025	8.23%	15.55%
100		5	0.73	0.62	0.84	0.71	0.62	0.82	0.039	11.90%	10.98%
101		5	0.76	0.67	0.86	0.75	0.69	0.89	0.034	9.90%	6.71%

ELB
12/2/22

CETIS Analytical Report

Report Date: 09 Dec-22 12:47 (p 2 of 2)
 Test Code/ID: 775B4EDB / 20-0247-2667

Fathead Minnow 7-d Larval Survival and Growth Test

Bio-Analytical Laboratories

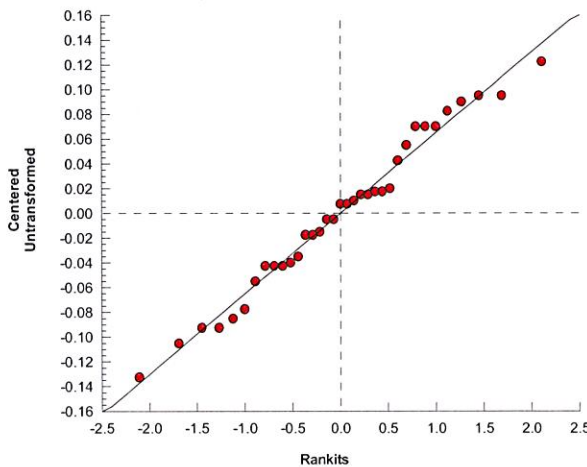
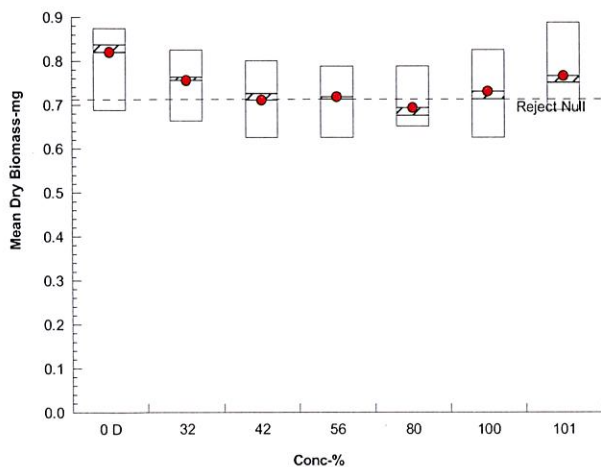
Analysis ID: 10-8698-3900 Endpoint: Mean Dry Biomass-mg CETIS Version: CETISv1.9.7
 Analyzed: 09 Dec-22 12:46 Analysis: Parametric-Control vs Treatments Status Level: 1
 Edit Date: 09 Dec-22 12:43 MD5 Hash: 6FDF3957F4FF6915F285E5D2559C5720 Editor ID: 008-522-314-5

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.84	0.88	0.84	0.86	0.69
32		0.83	0.76	0.75	0.66	0.78
42		0.8	0.73	0.72	0.62	0.68
56		0.79	0.71	0.79	0.68	0.62
80		0.65	0.65	0.7	0.67	0.79
100		0.82	0.62	0.68	0.71	0.81
101		0.77	0.73	0.69	0.89	0.75

100 UV

Graphics



CETIS Analytical Report

Report Date: 09 Dec-22 12:47 (p 1 of 2)
Test Code/ID: 775B4EDB / 20-0247-2667

Fathead Minnow 7-d Larval Survival and Growth Test

Bio-Analytical Laboratories

Analysis ID: 01-0784-8058	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.9.7
Analyzed: 09 Dec-22 12:47	Analysis: Linear Interpolation (ICPIN)	Status Level: 1
Edit Date: 09 Dec-22 12:43	MD5 Hash: F85DDCA8C6A0DB95F0142249B34C29C5	Editor ID: 008-522-314-5
Batch ID: 14-0282-4454	Test Type: Growth-Survival (7d)	Analyst:
Start Date: 28 Nov-22 17:35	Protocol: EPA/821/R-02-013 (2002)	Diluent: Reconstituted Water
Ending Date: 05 Dec-22 16:30	Species: Pimephales promelas	Brine:
Test Length: 6d 23h	Taxon: Actinopterygii	Source: In-House Culture Age: <24
Sample ID: 05-6991-9000	Code: X8558	Project: WET Quarterly Compliance Test (4Q)
Sample Date: 28 Nov-22 08:00	Material: POTW Effluent	Source: AR0043613
Receipt Date: 28 Nov-22 13:43	CAS (PC):	Station: 001
Sample Age: 10h (5.6 °C)	Client: Magnolia Wastewater System	

Linear Interpolation Options

X Transform	Y Transform	Seed	Resamples	Exp 95% CL	Method
Linear	Linear	1908115	1000	Yes	Two-Point Interpolation

Test Acceptability Criteria

Attribute	Test Stat	TAC Limits		Overlap	Decision
		Lower	Upper		
Control Resp	0.82	0.25	>>	Yes	Passes Criteria

Point Estimates

Level	%	95% LCL	95% UCL	TU	95% LCL	95% UCL
IC10	36	14	---	2.768	---	7.352
IC15	>100	---	---	<1	---	---
IC20	>100	---	---	<1	---	---
IC25	>100	---	---	<1	---	---
IC40	>100	---	---	<1	---	---
IC50	>100	---	---	<1	---	---

Mean Dry Biomass-mg Summary

Conc-%	Code	Count	Calculated Variate						Isotonic Variate	
			Mean	Median	Min	Max	CV%	%Effect	Mean	%Effect
0	D	5	0.82	0.84	0.69	0.88	9.25%	0.00%	0.82	0.00%
32		5	0.76	0.76	0.66	0.83	7.82%	7.93%	0.76	7.93%
42		5	0.71	0.72	0.62	0.8	9.18%	13.41%	0.71	12.96%
56		5	0.72	0.71	0.62	0.79	9.90%	12.50%	0.71	12.96%
80		5	0.69	0.67	0.65	0.79	8.23%	15.55%	0.71	13.26%
100		5	0.73	0.71	0.62	0.82	11.90%	10.98%	0.71	13.26%

Mean Dry Biomass-mg Detail

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.84	0.88	0.84	0.86	0.69
32		0.83	0.76	0.75	0.66	0.78
42		0.8	0.73	0.72	0.62	0.68
56		0.79	0.71	0.79	0.68	0.62
80		0.65	0.65	0.7	0.67	0.79
100		0.82	0.62	0.68	0.71	0.81

CETIS Analytical Report

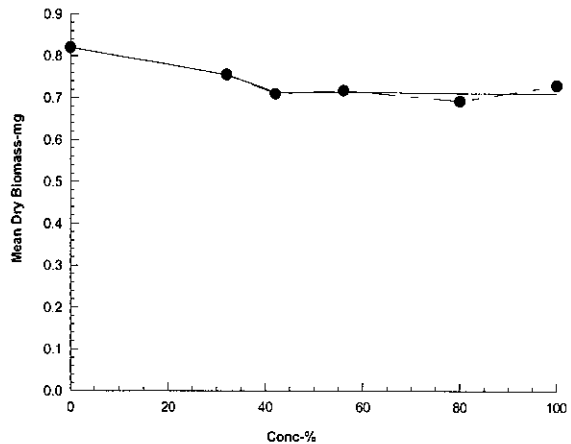
Report Date: 09 Dec-22 12:47 (p 2 of 2)
Test Code/ID: 775B4EDB / 20-0247-2667

Fathead Minnow 7-d Larval Survival and Growth Test

Bio-Analytical Laboratories

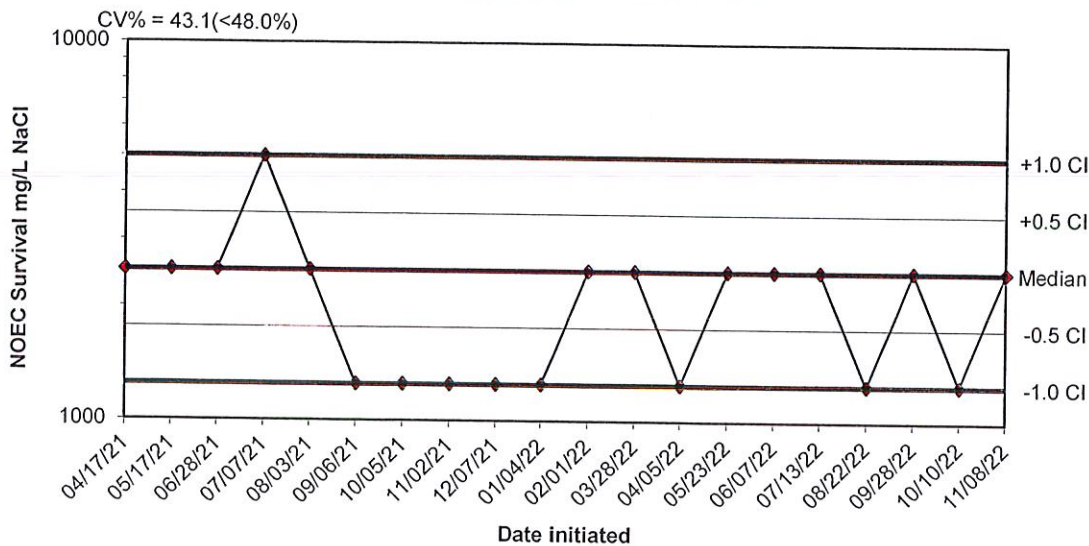
Analysis ID: 01-0784-8058	Endpoint: Mean Dry Biomass-mg	CETIS Version: CETISv1.9.7
Analyzed: 09 Dec-22 12:47	Analysis: Linear Interpolation (ICPIN)	Status Level: 1
Edit Date: 09 Dec-22 12:43	MD5 Hash: F85DDCA8C6A0DB95F0142249B34C29C5	Editor ID: 008-522-314-5

Graphics



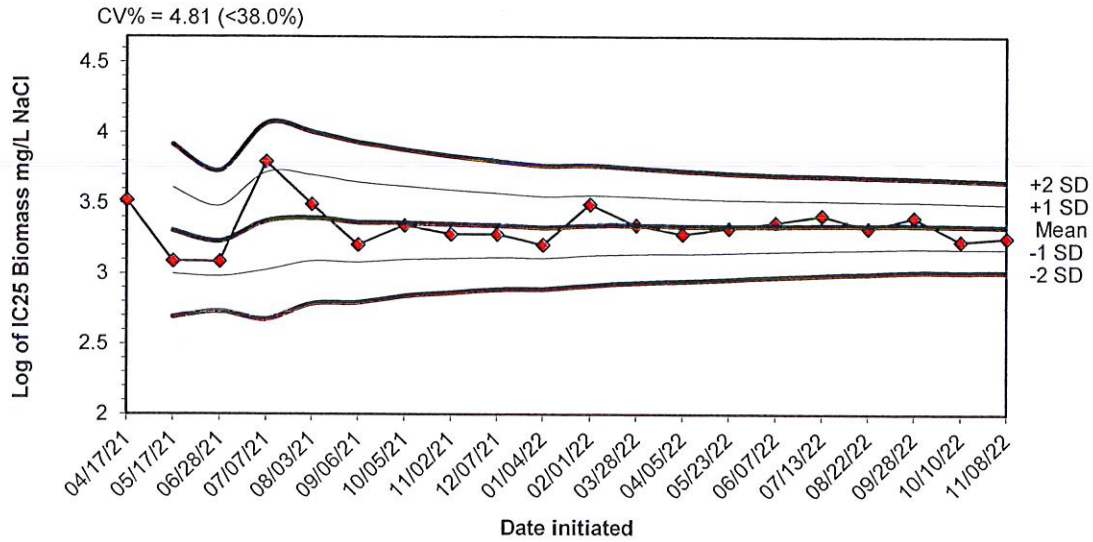
APPENDIX D
QUALITY ASSURANCE CHARTS

**CHRONIC REFERENCE TOXICANT TEST RESULTS FOR PIMEPHALES
 PROMELAS IN MH WATER**



Dates	Values	Median	-0.5 CI	-1.0 CI	+0.5 CI	+1.0 CI
04/17/21	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
05/17/21	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
06/28/21	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
07/07/21	5000.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
08/03/21	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
09/06/21	1250.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
10/05/21	1250.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
11/02/21	1250.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
12/07/21	1250.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
01/04/22	1250.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
02/01/22	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
03/28/22	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
04/05/22	1250.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
05/23/22	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
06/07/22	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
07/13/22	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
08/22/22	1250.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
09/28/22	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
10/10/22	1250.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000
11/08/22	2500.0000	2500.0000	1767.7670	1250.0000	3535.5339	5000.0000

CHRONIC REFERENCE TOXICANT TEST RESULTS FOR PIMEPHALES PROMELAS IN MH WATER



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
04/17/21	3.5199					
05/17/21	3.0878	3.3039	2.9983	2.6927	3.6094	3.9150
06/28/21	3.0854	3.2310	2.9809	2.7307	3.4812	3.7314
07/07/21	3.7924	3.3714	3.0242	2.6771	3.7185	4.0657
08/03/21	3.4914	3.3954	3.0900	2.7846	3.7008	4.0061
09/06/21	3.2041	3.3635	3.0794	2.7953	3.6476	3.9317
10/05/21	3.3424	3.3605	3.1010	2.8416	3.6199	3.8794
11/02/21	3.2788	3.3503	3.1083	2.8664	3.5922	3.8342
12/07/21	3.2788	3.3423	3.1148	2.8872	3.5699	3.7975
01/04/22	3.2041	3.3285	3.1096	2.8906	3.5475	3.7664
02/01/22	3.4914	3.3433	3.1299	2.9164	3.5568	3.7702
03/28/22	3.3424	3.3432	3.1397	2.9362	3.5467	3.7503
04/05/22	3.2788	3.3383	3.1426	2.9469	3.5339	3.7296
05/23/22	3.3222	3.3371	3.1491	2.9611	3.5252	3.7132
06/07/22	3.3617	3.3388	3.1575	2.9761	3.5201	3.7014
07/13/22	3.4150	3.3435	3.1673	2.9911	3.5197	3.6959
08/22/22	3.3222	3.3423	3.1716	3.0009	3.5130	3.6836
09/28/22	3.3979	3.3454	3.1793	3.0132	3.5115	3.6776
10/10/22	3.2304	3.3393	3.1758	3.0122	3.5029	3.6664
11/08/22	3.2553	3.3351	3.1748	3.0145	3.4954	3.6557

**APPENDIX E
AGENCY FORMS**

**SUMMARY REPORTING FORMS CHRONIC BIOMONITORING
 FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL
 (*Pimephales promelas*)**

Permittee: Magnolia Wastewater System

NPDES No.: AR0043613

AFIN: 14-00059

	Time	Date	To	Time	Date
Composite 1 Collected from:	0800	11/27/22		0800	11/28/22
Composite 2 Collected from:	0800	11/29/22		0800	11/30/22
Composite 3 Collected from:	0800	12/01/22		0800	12/02/22

Test initiated:	1735	am/pm	11/28/22	Date
Test terminated:	1630	am/pm	12/05/22	Date
Dilution water used:	Receiving		X	Reconstituted

DATA TABLE FOR SURVIVAL

Effluent Conc. %	Percent Survival in Replicate Chambers					Mean Percent Survival			CV%*
	A	B	C	D	E	24h	48h	7 days	
0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.00
32.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.00
42.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	0.00
56.0	100.0	100.0	100.0	100.0	88.0	100.0	100.0	98.0	6.06
80.0	100.0	88.0	100.0	88.0	100.0	100.0	100.0	95.0	7.62
100.0	100.0	88.0	88.0	100.0	100.0	100.0	100.0	95.0	7.62

DATA TABLE FOR GROWTH

Effluent Conc. %	Average Dry Weight in milligrams in replicate chambers					Mean Dry Weight mg	CV*
	A	B	C	D	E		
0	0.840	0.880	0.840	0.860	0.690	0.820	9.25
32.0	0.830	0.760	0.750	0.660	0.780	0.760	7.82
42.0	0.800	0.730	0.720	0.620	0.680	0.710	9.18
56.0	0.790	0.710	0.790	0.680	0.620	0.720	9.90
80.0	0.650	0.650	0.700	0.670	0.790	0.690	8.23
100.0	0.820	0.620	0.680	0.710	0.810	0.730	11.90

*coefficient of variation = standard deviation x 100/mean.

PMSD =13.14 %

FATHEAD MINNOW LARVAE GROWTH AND SURVIVAL (cont)
(Pimephales promelas)

1. Dunnett's Procedure or Steels Many-One Rank Test as appropriate:

Is the mean survival at 7 days significantly different (p=.05) than the control survival for the % effluent corresponding to:

a) LOW FLOW OR CRITICAL DILUTION (100.0%)	YES	X	NO
b) ½ LOW FLOW DILUTION (NA%)	YES		NO

2. Dunnett's Procedure (or appropriate test):

Is the mean dry weight (growth) at 7 days significantly different (p=.05) than the control's dry weight for the % effluent corresponding to (significant non-lethal effects):

a) LOW FLOW OR CRITICAL DILUTION (100.0%)	YES	X	NO
b) ½ LOW FLOW DILUTION (NA%)	YES		NO

3. If you answered NO to 1. a) and 2. a) enter (0) otherwise enter (1): 0
4. If you answered NO to 1. b) and 2. b) enter (0) otherwise enter (1):
5. Enter response to item 3 on DMR Form, parameter #TEP6C.
6. Enter response to item 4 on DMR Form, parameter #TFP6C.
7. Enter percent effluent corresponding to each NOEC below and circle lowest number:

a.) NOEC survival	100.0% effluent
b.) NOEC growth	100.0% effluent

Biomonitoring Form
 Chronic Toxicity Summary Form for Pimephales promelas
 Chemical Parameters Chart

Permittee: Magnolia Wastewater System
 NPDES#: AR0043613/AFIN 14-00059
 Contact: Tracie Love
 Analysts: Ware, Mitchell, Miller, Morado

Sample #1 Collected: 11/28/2022 Time: 800
 Sample #2 Collected: 11/11/30/22 Time: 800
 Sample #3 Collected: 12/2/2022 Time: 800
 Test Begin: 11/28/2022 Time: 1735
 Test End: 12/5/2022 Time: 1630

Dilution:	0%							56.0%						
Day:	1	2	3	4	5	6	7	1	2	3	4	5	6	7
T (°C)	24.0	24.4	24.5	24.3	23.8	24.3	24.6	24.0	24.4	24.5	24.3	23.8	24.3	24.6
DO Initial	7.1	5.6	6.5	5.0	6.0	5.5	6.3	5.9	4.9	5.0	4.0	5.0	4.3	6.2
DO Final	7.5	7.4	7.6	7.6	7.4	7.5	7.1	7.5	7.2	7.6	8.1	7.9	8.2	6.9
pH Initial	6.8	6.7	7.0	6.3	6.2	6.1	7.1	6.8	7.0	7.3	6.4	6.3	6.2	6.9
pH Final	7.3	7.2	7.3	6.4	7.3	7.4	7.4	7.8	7.3	7.2	6.5	7.2	7.0	7.0
Conductivity	165.0	182.0	197.0	175.0	171.0	163.0		244.0	237.0	274.0	249.0	286.0	261.0	
Alkalinity	28.0				40.0									
Hardness	48.0				52.0									
Chlorine	<0.5				<0.5									
Dilution:	32.0%							80.0%						
Day:	1	2	3	4	5	6	7	1	2	3	4	5	6	7
T (°C)	24.0	24.4	24.5	24.3	23.8	24.3	24.6	24.0	24.4	24.5	24.3	23.8	24.3	24.6
DO Initial	6.0	4.8	7.0	4.4	5.5	4.9	7.0	5.7	4.9	5.9	3.9	4.8	4.2	6.2
DO Final	7.5	7.4	7.5	7.0	7.6	8.2	6.9	7.7	7.5	7.8	8.4	8.3	8.2	6.9
pH Initial	6.8	6.8	7.2	6.2	6.0	6.0	6.9	6.9	7.0	7.2	6.5	6.4	6.3	6.9
pH Final	7.5	7.2	7.3	6.6	7.2	7.1	7.1	7.8	7.3	7.3	6.5	7.1	6.9	6.9
Conductivity	254.0	216.0	235.0	217.0	236.0	223.0		340.0	365.0	313.0	284.0	336.0	297.0	
Alkalinity														
Hardness														
Chlorine														
Dilution:	42.0%							100.0%						
Day:	1	2	3	4	5	6	7	1	2	3	4	5	6	7
T (°C)	24.0	24.4	24.5	24.3	23.8	24.3	24.6	24.0	24.4	24.5	24.3	23.8	24.3	24.6
DO Initial	6.0	5.0	7.0	4.1	5.3	4.6	6.2	5.6	5.0	6.9	3.9	4.6	4.1	6.0
DO Final	7.5	7.4	7.6	8.0	7.8	8.4	7.0	7.8	7.2	7.9	8.6	8.5	8.4	6.1
pH Initial	6.8	6.9	7.3	6.3	6.2	6.0	7.0	6.9	7.0	7.3	6.6	6.5	6.4	6.1
pH Final	7.7	7.1	7.3	6.5	7.2	7.1	7.1	7.8	7.3	7.3	6.5	7.1	6.9	6.9
Alkalinity								72.0		80.0		80.0		
Hardness								52.0		40.0		28.0		
Conductivity	283.0	224.0	256.0	231.0	250.0	263.0		262.0	291.0	344.0	318.0	367.0	333.0	
Chlorine								<0.5		<0.5		<0.5		

Comments:

APPENDIX F
REPORT QUALITY ASSURANCE FORM



Bio-Analytical Laboratories

3240 Spurgin Road
Post Office Box 527
Doyline, LA 71023

(318) 745-2772
1-800-259-1246
Fax: (318) 745-2773

REPORT QUALITY ASSURANCE FORM

Client: City of Magnolia

Project#: X8558

Chain of Custody Documents Checked by: EOB 12/12/22
Technician/Date

Raw Data Documents Checked by: EOB 12/12/22
Technician/Date

Statistical Analysis Package Checked by: EOB 12/12/22
Quality Manager/Date

Quality Control Data Checked by: EOB 12/15/22
Quality Manager/Date

Report Checked by: EOB 12/22/22
Quality Manager/Date

I certify that this document was prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. The information contained in this document, to the best of my knowledge, is true, accurate and complete.

Carroll P. Beupp, BS
Quality Manager

12/22/22
Date

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