

**Little Rock Water Reclamation Authority**  
**NPDES Permit No.: AR 0021806**  
**AFIN Number 60-00409**

**Chronic Biomonitoring Report**  
**for**  
**March 2023**

## TABLE OF CONTENTS

<b><u>Section</u></b>	<b><u>Description</u></b>	<b><u>Page No.</u></b>
I.	Introduction	1
II.	Plant Operations	3
III.	Sources of Effluent and Dilution Waters	6
IV.	Test Methods	10
V.	Test Organisms	13
VI.	Quality Assurance	15
VII.	Results	16
VIII.	Appendices	
	A. ADEQ Report Forms	
	B. Huther and Associates Quality Assurance Report	
	C. Huther and Associates, Inc.'s Report	

**SECTION I  
INTRODUCTION**

1. Permit Number

The NPDES permit number for the Adams Field Water Reclamation Facility is AR0021806. This facility is a publicly owned treatment works operated by Little Rock Water Reclamation Authority.

2. Toxicity Testing Requirements of Permit

Quarterly Whole Effluent Toxicity monitoring for two test species. They are:

- Chronic static renewal 7-day survival and reproduction test using *Ceriodaphnia dubia* (Method 1002.0).
- Chronic static renewal 7-day larval survival and growth test using fathead minnows (*Pimephales promelas*) (Method 1000.0).

3. Plant Location

The Adams plant is located at 1001 Temple Street in Little Rock which is on the southwest side of the Arkansas River just east of Little Rock's Adams Field Municipal Airport. (See page 2 for vicinity map location.)

4. Name of Receiving Water Body

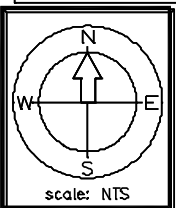
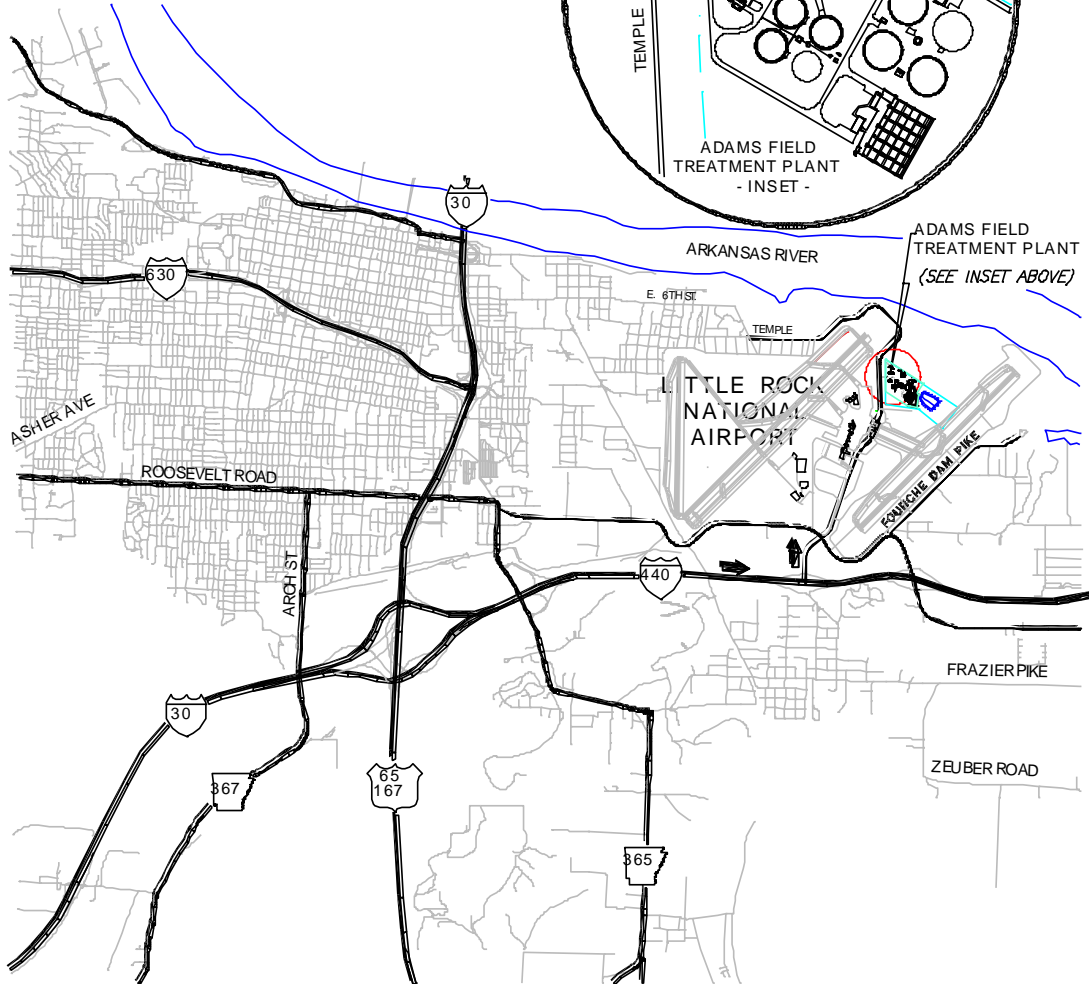
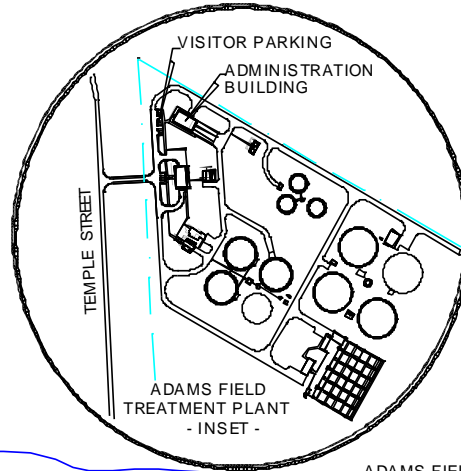
Arkansas River

5. Contract Laboratory (If the Tests are Performed Under Contract)

Huther and Associates, Inc.  
1156 North Bonnie Brae  
Denton, Texas 76201  
Telephone: (940)387-1025

**DIRECTIONS:**

TAKE I-440 TO THE AIRPORT ROAD EXIT;  
 TAKE AIRPORT ROAD EXIT AND FOLLOW  
 OVERPASS ALONG AIRPORT ROAD; STAY  
 ON AIRPORT ROAD THRU AIRPORT, IT WILL  
 CHANGE TO TEMPLE STREET. AFTP IS  
 LOCATED AT 1001 TEMPLE STREET.



PREPARED BY: EVANGELINE O'NEAL  
 SR. DRAFTER, LRWU TECH SVCS  
 DATE: 06 JUNE 2000

G:\TS\DFT\1-SUPERVISOR\LRWU  
 \TREATMENT PLANTS\LOCATOR MAPS\ADAMS  
 \ADAMS FIELD TP LOCATOR MAP.DWG

**ADAMS FIELD TREATMENT PLANT**

1001 TEMPLE STREET LITTLE ROCK, AR  
 TELEPHONE 501-688-1525



## SECTION II PLANT OPERATIONS

1. Product(s)

Treated effluent from a publicly owned treatment works that receives municipal sewage.

2. Raw Materials

Raw sewage sources are mainly domestic from household waste, pretreated industrial waste with some contributions from commercial sources.

3. Operating Schedule

The Water Reclamation Facility receives and subsequently discharges flow at a continuous rate. The Water Reclamation Facility is staffed twenty-four hours a day by one operator or shift supervisor. During the day shift, Monday - Friday, one extra relief crew is on duty as well as the Plant Superintendent.

4. Description of Waste Treatment

Preliminary Treatment. All incoming municipal sewage enters a screen chamber with 3/8 inch openings for screening followed by flow measurement.

Primary Treatment. All Flow from the preliminary treatment units is treated in the primary clarifiers. Primary Treatment includes grit and scum removal which returns to the preliminary treatment building for disposal.

Secondary Treatments. The treatment works has a complete-mix activated sludge process for secondary treatment.

Disinfection. The final effluent is UV disinfected prior to discharge to the Arkansas River.

Solids Handling and Disposal. The main sources of solids are: 1) primary sludge, and 2) waste activated sludge. The waste activated and primary sludges are transferred to the Fourche Creek Water Reclamation Facility. All sludges are processed in gravity sludge thickeners or a gravity belt thickener prior to transfer to anaerobic digesters. The digested sludge is pumped to biosolids, storage lagoons and ultimately disposed of through approved land application methods.

5. Schematic of Waste Treatment

See page 5 for plant schematics.

6. Retention Time (If Applicable)

Retention times at design flow:

Primary Treatment .....	2 hours
Activated Sludge Process .....	6 hours
A.S.P. Final Tanks.....	2 hours
UV Disinfection .....	Instantaneous
PAA Supplemental Disinfection .....	7.2 min

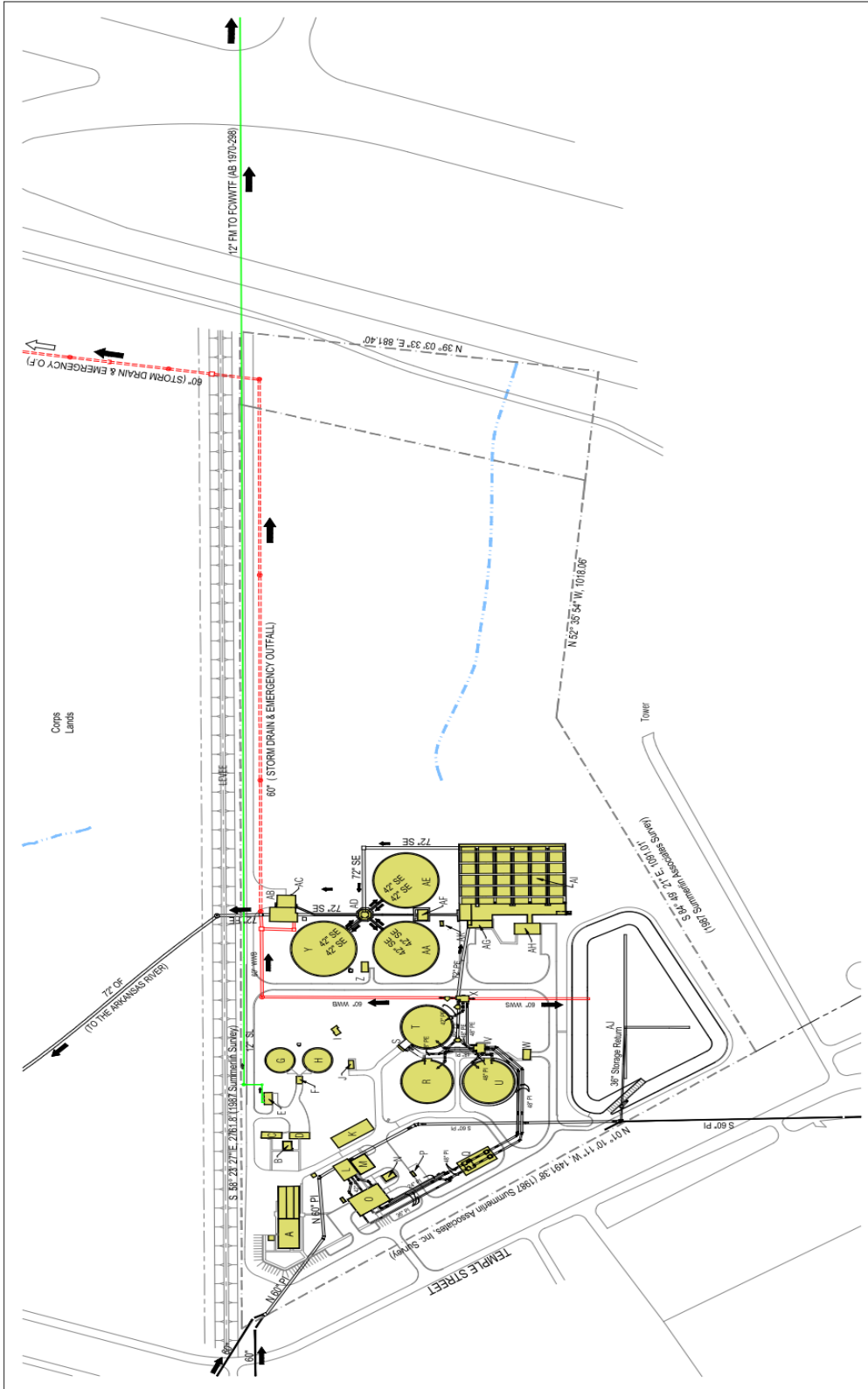
7. Volume of Waste Flow

The Adams Field Plant's effluent flows during the biomonitoring sampling event were:

<u>Date</u>	<u>Flow, MGD</u>
03/07/23 – 03/08/23	29.49
03/09/23 – 03/10/23	50.93
03/12/23 – 03/13/23	40.78

8. Design Flow of Treatment Facility at Time of Sampling

36 MGD



**STRUCTURE LEGEND**

A	ADMINISTRATION BLDG
B	DRAIN PIT
C	GREASE HOLDING TANK
D	SEPTAGE RECEIVING TANK
E	SLUDGE TRANSFER P/S
F	STORAGE BUILDING
G	THICKENER #1
H	THICKENER #2
I	THICKENER OVERFLOW JUNCTION
J	PRIM TREATMENT ELECT BLDG
K	BIOFILTER
L	SCREENING CHAMBER
M	PREL TREATMENT BLDG
N	MAN ELECT BUILDING
O	MAN PS
P	MAN GENERATOR
Q	VALVE VAULT
R	SLUDGE TRANSFER P/S
S	STORAGE BUILDING
T	THICKENER #1
U	THICKENER #2
V	PRIM INFLUENT FLOW SPLITTER BOX
W	STORAGE BUILDING
X	PRIM EFFLUENT JUNCTION BOX
Y	FINAL CLARIFIER #1
Z	MAKEUP WATER P/S

**PIPING LEGEND**

AA	FINAL CLARIFIER #2
AB	PAA INTERMITTENT FEED ROOM
AC	UV DISINFECTION BASIN FACILITY
AD	OCTAGON BOX
AE	FINAL CLARIFIER #3
AF	RETURN ACTIVATED SLUDGE P/S
AG	MIXING CHAMBER
AH	BLOWER BLDG
AI	AEORATION BASIN
AJ	EQUALIZATION BASIN
AK	SECONDARY GENERATOR

**FINAL EFFLUENT**

FE	FINAL EFFLUENT
FM	FORCE MAIN
OF	OUTFALL
PE	PRIMARY EFFLUENT
PI	PRIMARY INFLUENT
RAS	RETURN ACTIVATED SLUDGE
SD	STORM DRAIN
SE	SECONDARY EFFLUENT
SL	SLUDGE LINE
SI	SECONDARY INFLUENT
WS	WASTE ACTIVATED SLUDGE
WB	WET WEATHER BLENDING
WWS	WET WEATHER STORAGE

**ADAMS FIELD WASTEWATER TREATMENT FACILITY**  
**SITE PLAN**  
**& FLOW SCHEMATIC**

1001 Temple Street Little Rock, AR 72202  
 NW Quarter, Section 8, Township 1 North, Range 11 West  
 Plant Center - Latitude: 92° 12' 55.27238" W Longitude: 34° 44' 08.14822" N

Prepared by: Evangeline O'Neal, LRW  
 Updated: 12/06/2016  
 Filename: 2011 AFWWT SITE PLAN - FLOW SCHEMATIC.dwg

0' 100' 200'

**SECTION III**  
**SOURCE OF EFFLUENT, RECEIVING WATER, AND DILUTION WATER**

1. Plant Effluent Samples

(Special Samples Collected for Biomonitoring)

- A. Sampling Point: Adams Field - Plant Effluent  
 Outfall 001: Latitude: 34° 44' 05"N; Longitude 92° 12'46"W

(See page 2 for a vicinity map that shows the sampling locations.)

B. Collection Dates and Times:

1st sample	Setup	03/07/23 @ 12:00 pm
	Takeoff	03/08/23 @ 10:00 am

2nd sample	Setup	03/09/23 @ 9:00 am
	Takeoff	03/10/23 @ 7:00 am

3rd sample	Setup	03/12/23 @ 9:00 am
	Takeoff	03/13/23 @ 7:00 am

- C. Sample Collection Method: 24 Hour Flow-Proportioned Composite (12/24HFC)

D. Physical and Chemical Data

(Additional data in the appendices)

E. Mean Daily Discharge on Sample Collection Date

Date	Flow, MGD
03/07/23 – 03/08/23	29.49
03/09/23 – 03/10/23	50.93
03/12/23 – 03/13/23	40.78



- F. Lapsed Time from Sample Collection to Delivery and Sample Temperature when received by Contract Laboratory
- Sample 1: Relinquished 03/08/23 @ 01:50 PM - Shipped by America's Best Couriers  
Received 03/09/23 @ 10:00 AM - Temperature upon arrival was 2.6°C
  - Sample 2: Relinquished 03/10/23 @ 08:26 AM - Shipped by America's Best Couriers  
Received 03/10/23 @ 02:30 PM - Temperature upon arrival was 2.5°C
  - Sample 3: Relinquished 03/13/23 @ 08:24 AM - Shipped by America's Best Couriers  
Received 03/13/23 @ 01:40 PM - Temperature upon arrival was 1.7°C
2. Plant Effluent Samples
- (Regular NPDES Part I Monitoring)
- A. Sampling Point: Adams Field - Plant Effluent
- B. Collection Dates and Times:
- The 24-hour flow composite time period begins at 8:00 a.m. daily on the date listed below as "Flow Date". Sample aliquots are collected every 2.0 hrs with the last aliquot collected at 6:00 a.m. of the next day.
- C. Sample Collection Method: 24 Hour Flow Proportioned Composite (12/24HFC)
- The sample aliquots are collected automatically and flow proportioned manually at the end of the sampling period. The volume of each sample aliquot used to prepare the composite sample is calculated based upon the instantaneous flow at the time the sample aliquot is collected.

D. Physical and Chemical Data

**Adams Field Final Effluent Weekly Values**

March 2023

	126	2096	2031	2007	2081	2069	2066	2155	2200	2181	2068
	SPD - NPDES Plant Effluent Flow	LD-TSS Final Eff	LD-BOD5 Final Eff	LD-CBOD5 Final Eff	LD-pH Final Eff	LD-PAA Final Eff	LD-FCB Final Eff (IDEXX)	LD-NH3-N Final Eff	LD-Phosphorus Final Eff (Grab)	LD-NO2+NO3-N Final Eff (Grab) (V2167+V2178)	LD-UV Transmittance
Date	MGD	mg/L	mg/L	mg/L	S.U.	mg/L	MPN/100m	mg/L	mg/L	mg/L	%
Sun, Mar 05	50.48	4.3	11.34		6.68		108				71.90
Mon, Mar 06	44.10	4.7	8.47		6.68		655				70.50
Tue, Mar 07	29.49	<2.5	3.61						0.189		
Wed, Mar 08	31.91										
Thu, Mar 09	50.93										
Fri, Mar 10	58.34										
Sat, Mar 11	51.62										
Minimum					6.68						70.50
Maximum					6.68						71.90
Average	45.27	3.8	7.81				266		0.189		

3. Receiving Water Samples

A. Source - Arkansas River – Upstream of the Adams Field Final Effluent Outfall  
Latitude: 34° 47' 27"N; Longitude 92° 21' 31"W

B. Sample Collection Method - Grab Sample

C. Collection Date and Time

Collected on 03/08/23 @ 10:15 AM

D. Streamflow (at time of sampling)

03/08/23 – 91,710 cfs

E. Lapsed time from sample collection to delivery

- Sample 1: Relinquished 03/08/23 @ 01:50 PM - Shipped by America’s Best Couriers  
Received 03/09/23 @ 10:00 AM - Temperature upon arrival was 2.6°C
- Sample 2: Relinquished 03/10/23 @ 08:26 AM - Shipped by America’s Best Couriers  
Received 03/10/23 @ 02:30 PM - Temperature upon arrival was 2.5°C
- Sample 3: Relinquished 03/13/23 @ 08:24 AM - Shipped by America’s Best Couriers  
Received 03/13/23 @ 01:40 PM - Temperature upon arrival was 1.7°C

F. Physical and Chemical Data – Field Measurements

<b>Parameter Description</b>	<b>1st sample</b>	<b>2<sup>nd</sup> sample</b>	<b>3rd sample</b>
Date Collected	03/08/23	03/08/23	03/08/23
TDS, mg/L	52.0	52.0	52.0
pH, S.U.	7.74	7.74	7.74
Dissolved Oxygen, mg/L	9.22	9.22	9.22
Temperature, °C	13.6	13.6	13.6
TRC, mg/L	0.12	0.12	0.12

4. Dilution Water Samples

A. Source

Synthetic laboratory water prepared by contract laboratory

B. Collection Dates and Times

Distilled, deionized laboratory water was reconstituted by Huther and Associates, Inc. to match the receiving stream’s hardness, alkalinity, and pH for use as the test control and effluent dilutions.

C. Pretreatment

The city tap water is purified using the following treatment before being used in the preparation of synthetic laboratory water.

1. Distillation
2. Deionization

D. Physical and Chemical Characteristics

This data is included in Huther and Associates, Inc.’s Analytical Report attached as Appendix C.

**SECTION IV  
TEST METHODS**

Part A - *Pimephales promelas*

1. Toxicity Test Method Used (Title, Number, Source)  
  
7-Day Chronic Toxicity Test, Static Renewal, with *Pimephales promelas*, EPA Method 1000.0, (EPA-821-R-02-013)
2. Endpoint(s) of Test  
  
Larval Survival and Growth
3. Deviation(s) from Reference Method, if any, and the Reason(s)  
  
None
4. Date and Time Test Started  
  
March 9, 2023 @ 14:40
5. Date and Time Test Terminated  
  
March 16, 2023 @ 14:40
6. Type and Volume of Test Chambers  
  
300 mL distilled water rinsed plastic beakers
7. Volume of Solution Used Per Chamber  
  
250 mL solution/chamber
8. Number of Organisms Per Test Chamber  
  
8 organisms/chamber
9. Number of Replicate Test Chambers Per Concentration  
  
5 test chambers/concentration
10. Acclimation of Test Organisms (Temperature Mean and Range)  
  
The test organisms are cultured in-house by Huther and Associates, Inc. and originated from a minimum of three in-house spawning.
11. Test Temperature (Mean and Range)

25° ± 1°C

12. Specify if Aeration was Needed

None

13. Feeding Frequency, and Amount and Type of Food

Larvae in each test chamber were fed <24 hour old *Artemia* (brine shrimp) three times per day.

Part B - *Ceriodaphnia dubia*

1. Toxicity Test Method Used (Title, Number, Source)

7-Day Chronic Toxicity Test, Static Renewal, with *Ceriodaphnia dubia*, EPA Method 1002.0, (EPA-821-R-02-013)

2. Endpoint(s) of Test

Survival and Reproduction

3. Deviation(s) from Reference Method, if any, and the Reason(s)

None

4. Date and Time Test Started

March 9, 2023 @ 15:15

5. Date and Time Test Terminated

March 16, 2023 @ 15:15

6. Type and Volume of Test Chambers

25 mL distilled water rinsed plastic beakers

7. Volume of Solution Used Per Chamber

15 mL solution/chamber

8. Number of Organisms Per Test Chamber

1 Organism/chamber

9. Number of Replicate Test Chambers Per Concentration

10 replicate cups/concentration

10. Acclimation of Test Organisms (Temperature Mean and Range)

The test organisms were cultured in-house by Huther and Associates, Inc., Inc.

11. Test Temperature (Mean and Range)

25° ± 1°C

12. Specify if Aeration was Needed

None

13. Feeding Frequency, and Amount and Type of Food

Daily feeding consisted of 0.5 mL *Selenastrum capricornutum* and cerophyll per test chamber.

SECTION V  
TEST ORGANISMS

Part A: Fathead Minnow (*Pimephales promelas*)

1. Scientific Name

*Pimephales promelas*

2. Age

Less than 24 hours old at test initiation and originated from a minimum of three in-house spawning

3. Life Stage

Larval stage

4. Mean Length and Weight (Where Applicable)

Test Concentration (% Effluent)	Average Fish Weight, mg
AR River Control	0.4362
9%	0.4422
12%	0.4570
16%	0.4504
21%	0.4554
28%	0.4594

5. Source

Huther and Associates, Inc. culture their own *Pimephales promelas*. The larvae originated from a minimum of three in-house spawning.

6. Diseases and Treatment (Where Applicable)

N/A

Part B: Water Flea (*Ceriodaphnia dubia*)

1. Scientific Name

*Ceriodaphnia dubia*

2. Age

Less than 24 hours old at test initiation and within eight hours of the same age at test initiation.

3. Life Stage

Neonate

4. Mean Length and Weight (Where Applicable)

N/A

5. Source

Huther and Associates, Inc. cultures their own *Ceriodaphnia dubia*

6. Diseases and Treatment (Where Applicable)

N/A



**SECTION VI  
QUALITY ASSURANCE**

The QA information supplied by Huther and Associates, Inc. is contained in Appendix B.

**SECTION VII  
 RESULTS**

A summary of the whole effluent toxicity test results are listed below. Huther and Associates, Inc.’s complete report can be found in the appendix C.

Part A: *Pimephales promelas* (Fathead minnow) Results

The Adams Field’s effluent showed no statistically significant differences between the control and any effluent dilutions. The “No Observable Effects Concentration” (NOEC) for survival and growth was 28%. The coefficient of variation for the blank was 6.87% for growth and 0.00% for survival. The coefficient of variation for the critical dilution was 6.93% for growth and 0.00% for survival. The Percent Minimum Significant Difference (PMSD) was 10.2 %.

Part B: *Ceriodaphnia dubia* Results

The Adams Field’s effluent showed no statistically significant differences between the control and any effluent dilutions. The “No Observable Effects Concentration” (NOEC) for survival and reproduction was 28%. The coefficient of variation for the blank was 6.73% for reproduction and 0.00% for survival. The coefficient of variation for the critical dilution was 11.84% for reproduction and 0.00% for survival. The Percent Minimum Significant Difference (PMSD) was 9.7%.

<b>Table Summary of Test Data as Reported for Discharge Monitoring Report</b>	
<b>7-Day Static Renewal Sub-Lethal Effects - Pass/Fail</b>	
TGP3B – <i>Ceriodaphnia. dubia</i> – Reproduction	Pass (0)
TGP6C – <i>Pimephales promelas</i> – Growth	Pass (0)
<b>7-Day Static Renewal Lethal Effects - Pass/Fail</b>	
TLP3B – <i>Ceriodaphnia. dubia</i> - Survival	Pass (0)
TLP6C – <i>Pimephales promelas</i> – Survival	Pass (0)
<b>7-Day Static Renewal Toxic Lethal - No Observable Effects Concentration</b>	
TOP3B – <i>Ceriodaphnia dubia</i> Survival NOEC	28%
TOP6C – <i>Pimephales promelas</i> Survival NOEC	28%
<b>7-Day Static Renewal Toxic Sub-Lethal - No Observable Effects Concentration</b>	
TPP3B – <i>Ceriodaphnia dubia</i> – Reproduction NOEC	28%
TPP6C – <i>Pimephales promelas</i> – Growth NOEC	28%
<b>Coefficient of Variation (CV)</b>	
TQP3B – <i>Ceriodaphnia dubia</i> Reproduction	11.84%
TQP6C – <i>Pimephales promelas</i> Growth	6.93%

Part C: Conclusions and Recommendations

The NPDES Permit Chronic WET testing requirements were met with this passing test. No additional monitoring is required for the 1<sup>st</sup> quarter of 2023.

**APPENDIX A**  
**ADEQ FORMS**

**LITTLE ROCK WATER RECLAMATION AUTHORITY  
ADAMS FIELD WATER RECLAMATION FACILITY  
PERMIT NO. NPDES AR0021806  
OUTFALL 001  
TEST DATE: 03/09/23  
FOR NET DMR**

<b>I. <i>Ceriodaphnia dubia</i></b>	<b>Response</b>
a. If the NOEC for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0". <b>Parameter No. TLP3B.</b>	0
b. Report the NOEC value for survival, <b>Parameter No. TOP3B.</b>	28%
c. Report the NOEC value for reproduction, <b>Parameter No. TPP3B.</b>	28%
d. If the NOEC for reproduction is less than the critical dilution, enter a "1"; otherwise, enter a "0". <b>Parameter No. TGP3B.</b>	0
e. Report the higher coefficient of variation (critical dilution or control), <b>Parameter No. TQP3B.</b>	11.84%
 <b>II. <i>Pimephales promelas</i></b>	 <b>Response</b>
a. If the No Observed Effect Concentration (NOEC) for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0". <b>Parameter No. TLP6C.</b>	0
b. Report the NOEC value for survival, <b>Parameter No. TOP6C.</b>	28%
c. Report the NOEC value for growth, <b>Parameter No. TPP6C.</b>	28%
d. If the No Observed Effect Concentration (NOEC) for growth is less than the critical dilution, enter a "1"; otherwise, enter a "0". <b>Parameter No. TGP6C.</b>	0
e. Report the highest coefficient of variation (critical dilution or control) <b>Parameter No. TQP6C.</b>	6.93%
 <b><i>Ceriodaphnia dubia</i></b>	
22415 Retest Number 1 ( <i>For 9: First column param. NODI pulldown menu, highlight "9"</i> )	9
22416 Retest Number 2 ( <i>For 9: First column param. NODI pulldown menu, highlight "9"</i> )	9
51443 Retest Number 3 ( <i>For 9: First column param. NODI pulldown menu, highlight "9"</i> )	9
 <b><i>Pimephales promelas</i></b>	
22418 Retest Number 1 ( <i>For 9: First column param. NODI pulldown menu, highlight "9"</i> )	9
22419 Retest Number 2 ( <i>For 9: First column param. NODI pulldown menu, highlight "9"</i> )	9
51444 Retest Number 3 ( <i>For 9: First column param. NODI pulldown menu, highlight "9"</i> )	9

**In comment box at bottom left:** 9 = No retests required.

**APPENDIX B**

**Huther and Associates, Inc.**

**Quality Assurance Report**

**CHRONIC REFERENCE TOXICANT TEST RESULTS**

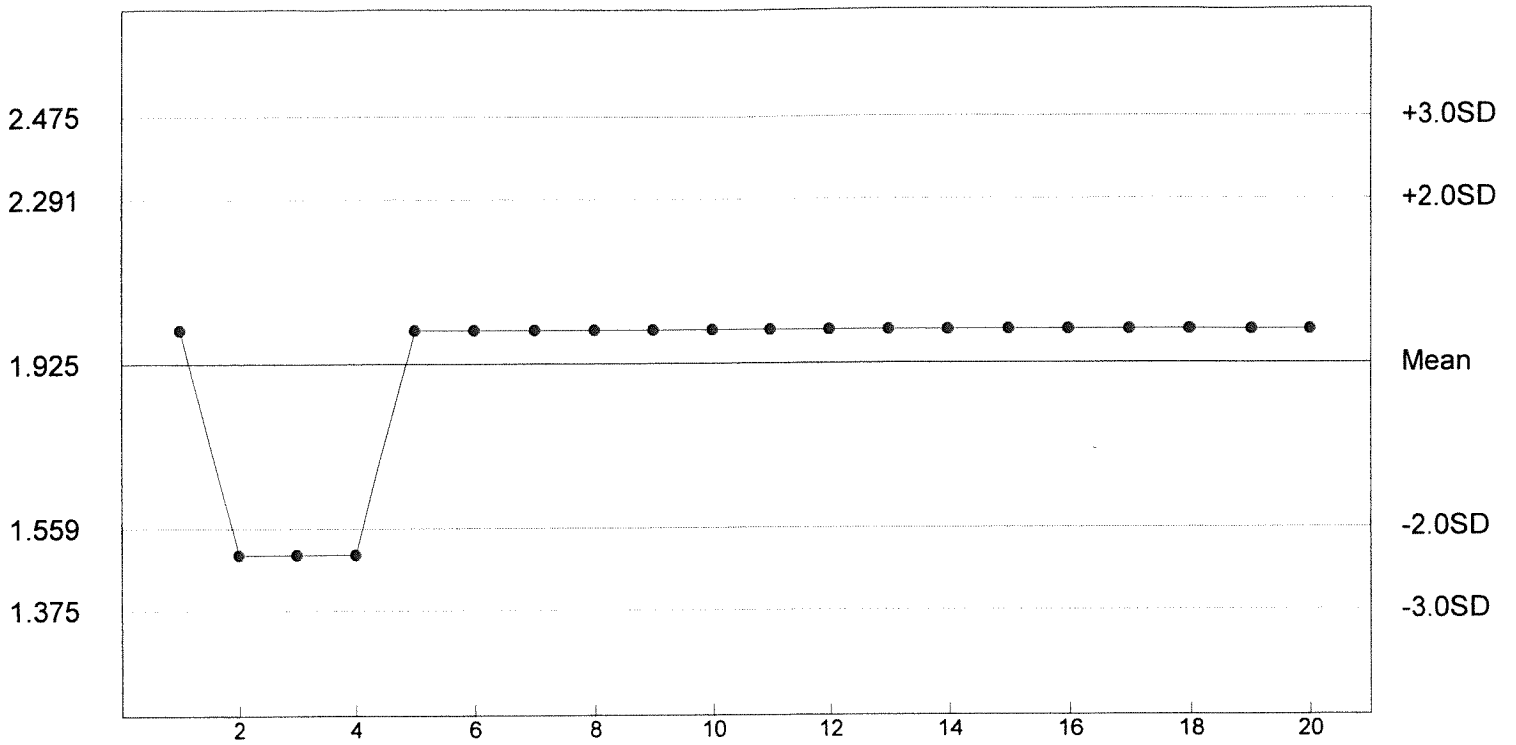
SPECIES: *Ceriodaphnia dubia*  
 CHEMICAL: Sodium Chloride  
 DURATION: 7-Days  
 TEST NUMBER: 3  
 TEST DATE: 03/02/23 - 03/09/23  
 0915 Hrs - 0915 Hrs  
 STATISTICAL METHOD: Dunnetts/Steels

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	2.0 g/L	1.5 g/L

Reference Tox Sodium Chloride g/L

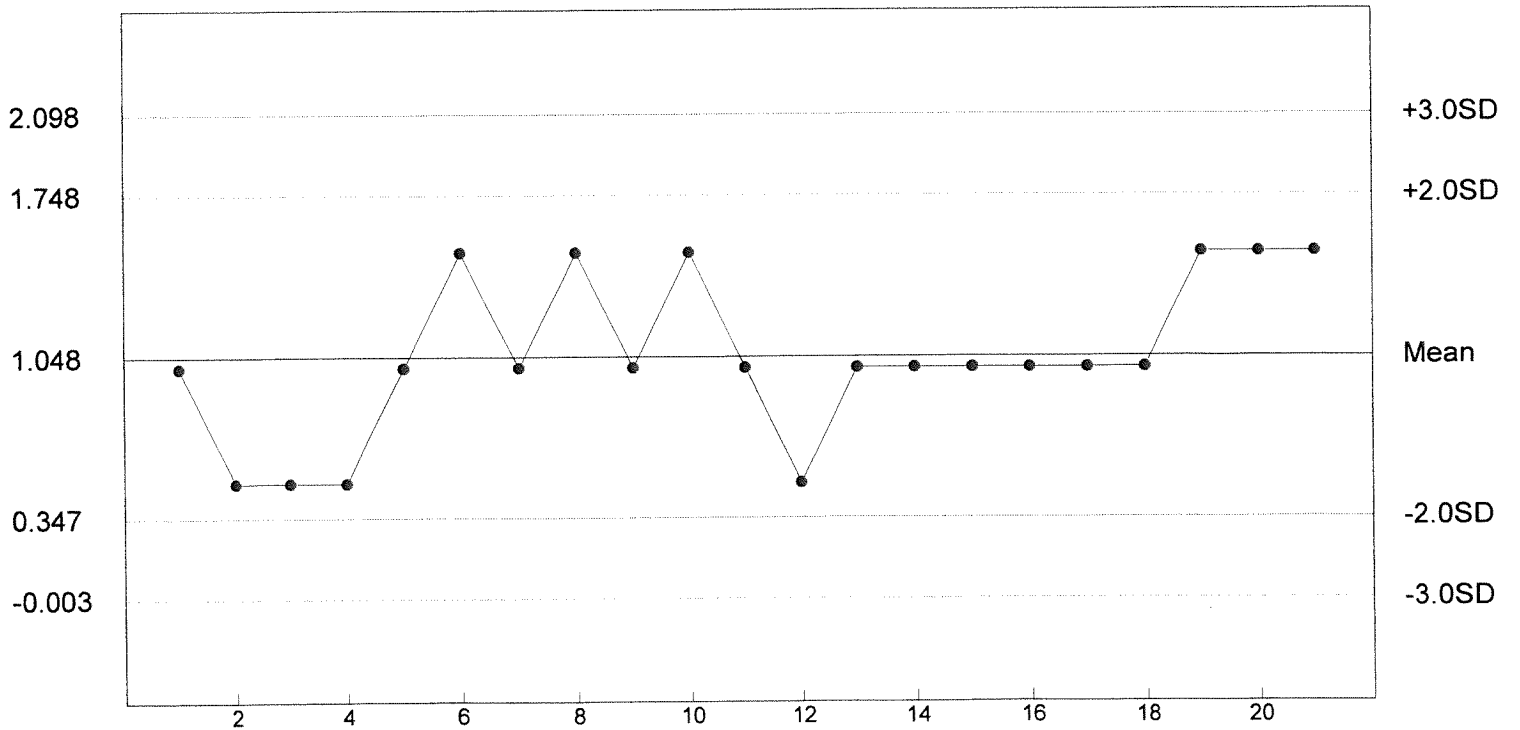
C. dubia Survival - NOEC



n= 20 Mean= 1.925 SD= 0.183 CV= 9.52% Min= 1.500 Max= 2.000

Reference Tox Sodium Chloride g/L

C. dubia Reproduction - NOEC



n= 21 Mean= 1.048 SD= 0.350 CV= 33.43% Min= 0.500 Max= 1.500



**CHRONIC REFERENCE TOXICANT TEST RESULTS**

SPECIES: *Pimephales promelas*

CHEMICAL: Copper Nitrate

DURATION: 7-Days

TEST NUMBER: 3

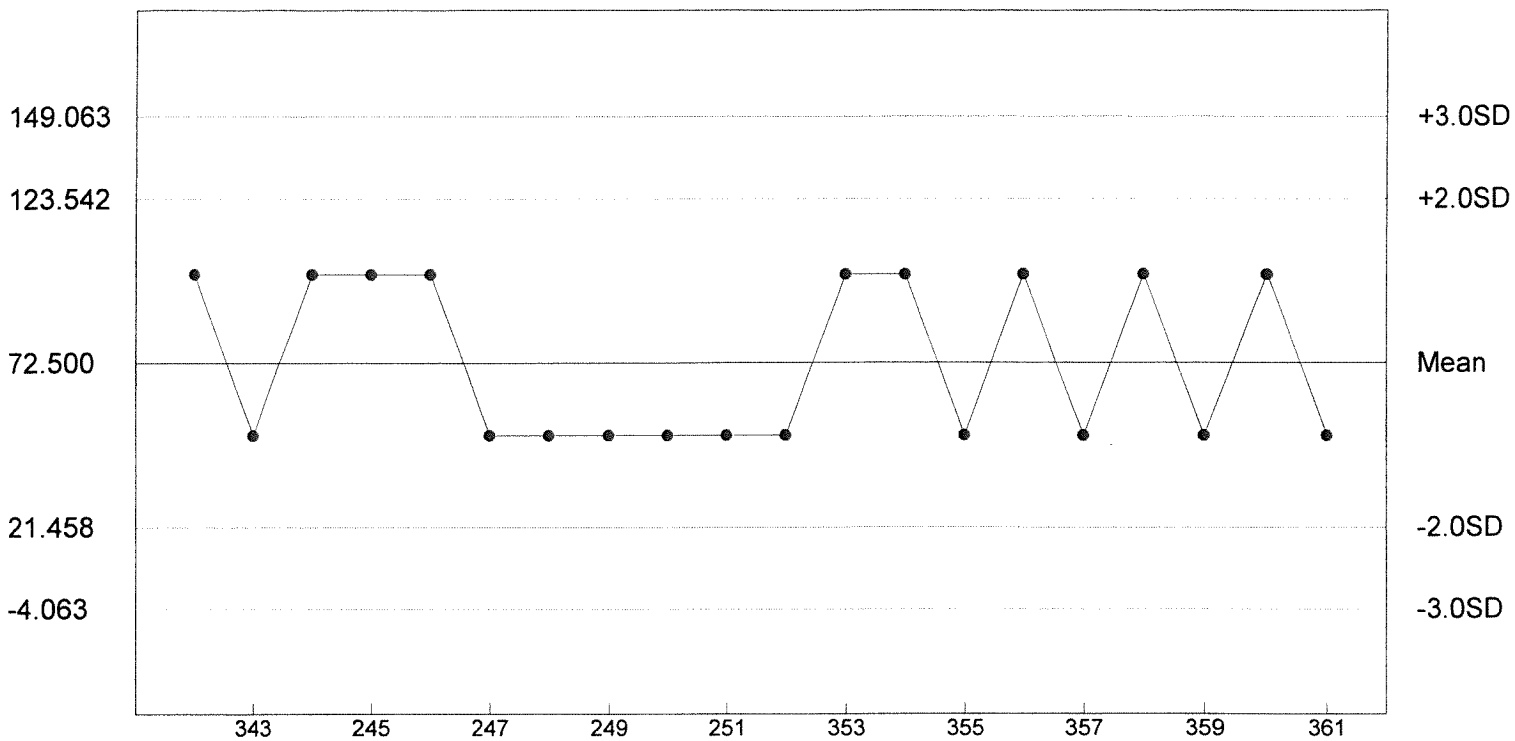
TEST DATE: 03/02/23 - 03/09/23  
1300 Hrs -1300 Hrs

STATISTICAL METHOD: Dunnetts/Steels

CONCENTRATION (ug/L)	NUMBER EXPOSED	NUMBER DEAD
12.5	40	0
25	40	0
50	40	0
100	40	13
200	40	27
400	40	40
800	40	40

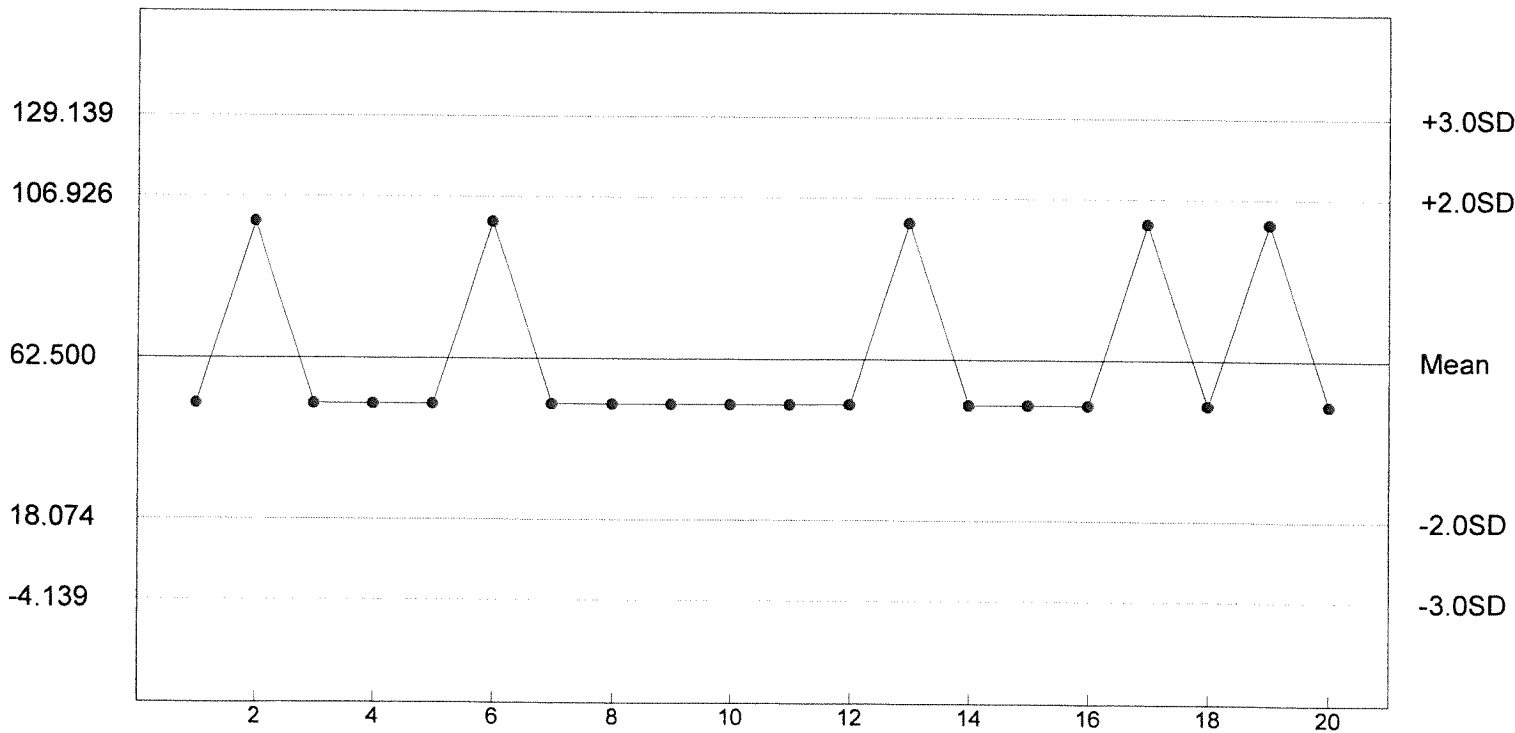
LOEC FOR SURVIVAL	NOEC FOR SURVIVAL	LOEC FOR GROWTH	NOEC FOR GROWTH
<b>100 ug/L</b>	<b>50 ug/L</b>	<b>100 ug/L</b>	<b>50 ug/L</b>

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

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

**APPENDIX C**

**HUTHER AND ASSOCIATES, INC.'S REPORT**

**March 2023**

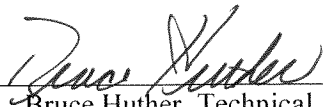
**LITTLE ROCK WATER RECLAMATION AUTHORITY  
ADAMS FIELD WATER RECLAMATION FACILITY  
OUTFALL 001**

Chronic Biomonitoring Report  
Permit Number NPDES AR0021806  
AFIN 60-00409

*Ceriodaphnia dubia*  
*Pimephales promelas*

March 9, 2023

Reviewed by:



Bruce Huther, Technical Director  
Huther & Associates, Inc.  
1156 North Bonnie Brae  
Denton, Texas 76201  
(940) 387-1025, Fax: (940) 387-1036

## TABLE OF CONTENTS

TOXICITY TEST REPORT .....	1
SUMMARY.....	3
<i>CERIODAPHNIA DUBIA</i> SURVIVAL AND REPRODUCTION SUMMARY .....	4
<i>CERIODAPHNIA DUBIA</i> STATISTICAL ANALYSES .....	8
<i>PIMEPHALES PROMELAS</i> SURVIVAL AND GROWTH SUMMARY .....	9
<i>PIMEPHALES PROMELAS</i> STATISTICAL ANALYSES.....	12
APPENDIX A: RAW DATA.....	13
APPENDIX B: REFERENCE TOXICANTS.....	14
APPENDIX C: CHAIN OF CUSTODY SHEETS .....	15



**TOXICITY TEST REPORT - CHRONIC**

Client ...Little Rock Water Reclamation Authority	Sample ..... Outfall 001
Facility ..Adams Field Water Reclamation Facility	Laboratory I.D. .... 34940
Permit No. .... NPDES AR0021806	Begin Date ..... March 9, 2023

Results: **Pass** *Ceriodaphnia dubia* survival and reproduction and *Pimephales promelas* survival and growth at the critical low flow concentration (21% effluent).

**SAMPLE COLLECTION**

Composite effluent samples from Little Rock Water Reclamation Authority, Adams Field Water Reclamation Facility were delivered by the client to Huther & Associates on March 9, March 10, and March 13, 2023. Effluent samples were collected from Outfall 001 using an automatic sampler and were manually composited 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 and receiving water samples were analyzed for total residual chlorine (Standard Methods, 24<sup>th</sup> Edition, 4500-Cl D) and contained <0.01 mg/L, <0.01 mg/L, and <0.01 mg/L, respectively. Effluent and receiving 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 1515 hours, March 9, 2023. Five concentrations were prepared (9%, 12%, 16%, 21%, and 28% effluent) utilizing receiving water (Arkansas River) as dilution water. 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 true control of ten replicate beakers containing one neonate each in receiving water was conducted concurrently with the test. There was 100% survival in the true control. In addition, a performance control of ten replicate beakers containing one neonate each in synthetic laboratory water was conducted concurrently with the test. The purpose of the performance control was to assess the health of the test organisms and to identify receiving water toxicity. The performance control data was not used in the statistical analysis of the test data. There was 100% survival in the performance control. The test ended at 1515 hours, March 16, 2023. 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: 28% 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: 9.7%**  
**NOEC: 28% Effluent**

**TEST SETUP**  
*Pimephales promelas*



The seven-day *Pimephales promelas* larval survival and growth test was initiated at 1440 hours, March 9, 2023. Five concentrations were prepared (9%, 12%, 16%, 21%, and 28% effluent) utilizing receiving water (Arkansas River) as dilution water. 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 true control of five replicate beakers of eight larvae each in receiving water was conducted concurrently with the test. There was 100% survival in the true control. In addition, a performance control of five replicate beakers of eight larvae each in synthetic laboratory water was conducted concurrently with the test. The purpose of the performance control was to assess the health of the test larvae and to identify receiving water toxicity. The performance control data was not used in the statistical analysis of the test data. There was 100% survival in the performance control. At the end of the test, all larvae were sacrificed, dried, and weighed. The test ended at 1440 hours, March 16, 2023. 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: 28% Effluent**

**GROWTH**  
*Pimephales promelas*

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

**LOEC: Not Applicable**                      **PMSD: 10.2%**  
**NOEC: 28% Effluent**

**SUMMARY**

There were no statistically significant differences between the control and the critical low flow concentration (21% 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 AR0021806 for Little Rock Water Reclamation Authority, Adams Field Water Reclamation Facility, Outfall 001 **passed** for this testing period.



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

CLIENT	Little Rock WRA, Adams Field WRF	SAMPLE TYPE	24 Hour Composite
NPDES #	AR0021806	DATE COLLECTED	03/08/23 03/10/23 03/13/23
LAB ID #	34940	DATE RECEIVED	03/09/23 03/10/23 03/13/23
TEST TYPE	7 Day Chronic	BEGIN DATE/TIME	03/09/23 1515
TEST ORGANISM	<i>Ceriodaphnia dubia</i>	END DATE/TIME	03/16/23 1515
ORGANISM AGE	< 24-Hours	TEST TEMPERATURE (°C)	25 ± 1
ORGANISM SOURCE	In House	PHOTO PERIOD	16-hr. Light 8-hr. Dark
RECEIVING WATER	Arkansas River	LIGHT INTENSITY	50-100 ft. cndl.
DILUTION WATER	Arkansas River	TECHNICIAN	T. Geiger

**SURVIVAL & REPRODUCTION SUMMARY**

Performance Control										
Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
03/10/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
03/11/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
03/12/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
03/13/23	4	3	2	4	5	3	2	4	4	4
	4	3	2	4	5	3	2	4	4	4
03/14/23	A	A	A	A	A	A	A	A	A	A
	4	3	2	4	5	3	2	4	4	4
03/15/23	9	10	8	8	6	7	9	9	6	9
	13	13	10	12	11	10	11	13	10	13
03/16/23	14	12	13	12	12	12	12	13	14	13
	27	25	23	24	23	22	23	26	24	26
x# Young 24.3                      C.V. 6.73% x%Survival 100%                      C.V. 0.00%										

True Control										
Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
03/10/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
03/11/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
03/12/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
03/13/23	5	2	2	5	3	4	2	3	4	2
	5	2	2	5	3	4	2	3	4	2
03/14/23	A	A	A	A	A	A	A	A	A	A
	5	2	2	5	3	4	2	3	4	2
03/15/23	11	11	8	7	8	10	6	8	9	8
	16	13	10	12	11	14	8	11	13	10
03/16/23	13	12	14	13	14	12	13	13	13	12
	29	25	24	25	25	26	21	24	26	22
x# Young 24.7                      C.V. 8.96% x%Survival 100%                      C.V. 0.00%										

9%Effluent										
Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
03/10/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
03/11/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
03/12/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
03/13/23	4	2	3	2	5	3	2	4	3	4
	4	2	3	2	5	3	2	4	3	4
03/14/23	A	A	A	A	A	A	A	A	A	A
	4	2	3	2	5	3	2	4	3	4
03/15/23	9	6	9	6	11	10	10	9	7	8
	13	8	12	8	16	13	12	13	10	12
03/16/23	13	13	13	13	14	12	12	13	12	14
	26	21	25	21	30	25	24	26	22	26
x# Young 24.6                      C.V. 11.21% x%Survival 100%                      C.V. 0.00%										

12%Effluent										
Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
03/10/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
03/11/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
03/12/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
03/13/23	4	2	2	2	3	5	3	2	5	3
	4	2	2	2	3	5	3	2	5	3
03/14/23	A	A	A	A	A	A	A	A	A	A
	4	2	2	2	3	5	3	2	5	3
03/15/23	9	7	9	11	7	10	8	10	10	10
	13	9	11	13	10	15	11	12	15	13
03/16/23	14	14	13	12	13	12	14	13	12	12
	27	23	24	25	23	27	25	25	27	25
x# Young 25.1                      C.V. 6.07% 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

Little Rock, Adams Field

Lab ID# 34940

Test Date: March 9, 2023

16%Effluent

Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
03/10/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
03/11/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
03/12/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
	4	2	3	5	3	5	4	2	3	4
03/13/23	A	A	A	A	A	A	A	A	A	A
	4	2	3	5	3	5	4	2	3	4
03/14/23	A	A	A	A	A	A	A	A	A	A
	9	8	8	6	10	11	6	10	8	7
03/15/23	A	A	A	A	A	A	A	A	A	A
	13	10	11	11	13	16	10	12	11	11
	12	14	13	14	14	12	12	12	12	13
03/16/23	A	A	A	A	A	A	A	A	A	A
	25	24	24	25	27	28	22	24	23	24
x# Young 24.6 C.V. 7.22%										
x%Survival 100% C.V. 0.00%										

21%Effluent

Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
03/10/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
03/11/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
03/12/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
	5	2	3	2	5	3	3	4	3	2
03/13/23	A	A	A	A	A	A	A	A	A	A
	5	2	3	2	5	3	3	4	3	2
03/14/23	A	A	A	A	A	A	A	A	A	A
	5	2	3	2	5	3	3	4	3	2
	8	7	9	9	10	10	9	11	7	6
03/15/23	A	A	A	A	A	A	A	A	A	A
	13	9	12	11	15	13	12	15	10	8
	13	12	12	13	13	14	12	14	13	12
03/16/23	A	A	A	A	A	A	A	A	A	A
	26	21	24	24	28	27	24	29	23	20
x# Young 24.6 C.V. 118.4%										
x%Survival 100% C.V. 0.00%										

28%Effluent

Date	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
03/10/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
03/11/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
03/12/23	A	A	A	A	A	A	A	A	A	A
	0	0	0	0	0	0	0	0	0	0
	4	2	3	5	3	2	2	5	4	5
03/13/23	A	A	A	A	A	A	A	A	A	A
	4	2	3	5	3	2	2	5	4	5
03/14/23	A	A	A	A	A	A	A	A	A	A
	4	2	3	5	3	2	2	5	4	5
	10	7	7	7	8	10	9	8	11	11
03/15/23	A	A	A	A	A	A	A	A	A	A
	14	9	10	12	11	12	11	13	15	16
	14	13	14	14	14	12	13	12	14	13
03/16/23	A	A	A	A	A	A	A	A	A	A
	28	22	24	26	25	24	24	25	29	29
x# Young 25.6 C.V. 9.24%										
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

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

Little Rock, Adams Field

Lab ID# 34940

Test Date: March 9, 2023

**WET CHEMISTRY MEASUREMENTS**

Date	Time	Temp	Samp. No.	pH of Solution						Analyst	
				PCON	TCON	9%	12%	16%	21%		28%
03/09/23	Start	25.0	1	8.02	7.47	7.29	7.22	7.19	7.19	7.20	JP
03/10/23	24 Hr.	24.1	1	7.97	7.82	7.61	7.55	7.52	7.53	7.55	JP
03/10/23	Renew	25.0	1	8.19	7.68	7.52	7.48	7.48	7.46	7.51	JP
03/11/23	48 Hr.	24.0	1	8.15	7.61	7.41	7.34	7.26	7.21	7.18	JP
03/11/23	Renew	25.0	2	8.22	7.53	7.29	7.19	7.13	7.09	7.09	JP
03/12/23	72 Hr.	24.0	2	8.14	7.78	7.38	7.24	7.15	7.09	7.07	AS
03/12/23	Renew	25.0	2	7.22	7.29	7.14	7.11	7.12	6.98	7.11	AS
03/13/23	96 Hr.	23.4	2	8.64	8.56	8.03	7.81	7.70	7.66	7.60	RP
03/13/23	Renew	25.0	2	8.53	8.26	7.80	7.51	7.42	7.38	7.34	RP
03/14/23	120 Hr.	23.9	2	7.76	8.19	8.42	8.55	7.85	7.63	7.43	HB
03/14/23	Renew	25.0	3	8.02	8.34	8.51	8.16	7.74	7.52	7.40	HB
03/15/23	144 Hr.	24.0	3	8.61	8.54	8.04	8.12	7.54	7.39	7.36	RP
03/15/23	Renew	25.0	3	8.36	8.43	8.01	7.79	7.62	7.48	7.41	RP
03/16/23	168 Hr.	24.0	3	8.55	7.87	7.90	7.93	7.93	7.92	7.91	JP

Date	Time	Temp	Samp. No.	DO (mg/L) of Solution						Analyst	
				PCON	TCON	9%	12%	16%	21%		28%
03/09/23	Start	25.0	1	7.07	7.82	7.84	8.64	8.47	8.34	8.41	JP
03/10/23	24 Hr.	24.1	1	8.64	8.19	8.60	8.11	8.48	7.87	8.45	JP
03/10/23	Renew	25.0	1	8.42	8.57	7.95	8.52	7.96	8.51	7.36	JP
03/11/23	48 Hr.	24.0	1	8.39	8.25	8.31	8.24	8.22	7.62	8.07	JP
03/11/23	Renew	25.0	2	8.12	7.91	7.86	8.18	7.15	7.85	8.31	JP
03/12/23	72 Hr.	24.0	2	7.70	8.62	8.53	8.47	8.48	8.46	8.64	AS
03/12/23	Renew	25.0	2	8.49	7.71	7.79	7.78	7.81	8.35	8.63	AS
03/13/23	96 Hr.	23.4	2	8.62	8.50	8.56	7.68	7.68	7.81	8.53	RP
03/13/23	Renew	25.0	2	8.13	7.91	7.86	8.30	7.86	7.79	7.93	RP
03/14/23	120 Hr.	23.9	2	7.81	7.83	7.29	8.27	8.29	8.36	8.43	HB
03/14/23	Renew	25.0	3	7.52	7.94	7.80	7.67	7.96	8.21	8.40	HB
03/15/23	144 Hr.	24.0	3	7.28	8.02	7.66	7.89	7.84	8.54	8.06	RP
03/15/23	Renew	25.0	3	7.30	8.18	8.32	8.20	8.36	8.34	8.34	RP
03/16/23	168 Hr.	24.0	3	7.54	8.15	7.77	7.45	8.40	8.24	7.53	JP

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

Little Rock, Adams Field

Lab ID# 34940

Test Date: March 9, 2023

**INITIAL CHEMISTRY MEASUREMENTS @ 100% EFFLUENT**

Date	Samp. No.	pH <sup>1</sup>	DO <sup>1</sup>	Hardness mg/L CaCO <sub>3</sub> <sup>1</sup>	Alkalinity mg/L CaCO <sub>3</sub> <sup>1</sup>	Conduct. μS/cm <sup>1</sup>	Resid.Cl <sub>2</sub> mg/L <sup>1</sup>	Dechlor(mL) Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> mg/L <sup>1</sup>	Analyst
03/09/23	1	7.45	7.74	28	70	278	<0.01	N/A	JP
03/11/23	2	7.04	7.43	32	66	228	<0.01	N/A	JP
03/14/23	3	7.10	7.36	24	58	237	<0.01	N/A	HB

**INITIAL CHEMISTRY MEASUREMENTS @ RECEIVING WATER**

Date	Samp. No.	pH <sup>1</sup>	DO <sup>1</sup>	Hardness mg/L CaCO <sub>3</sub> <sup>1</sup>	Alkalinity mg/L CaCO <sub>3</sub> <sup>1</sup>	Conduct. μS/cm <sup>1</sup>	Resid.Cl <sub>2</sub> mg/L <sup>1</sup>	Dechlor(mL) Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> mg/L <sup>1</sup>	Analyst
03/09/23	RS1	7.47	7.82	32	28	125	<0.01	N/A	JP
03/11/23	RS2	7.53	7.91	32	28	124	<0.01	N/A	JP
03/14/23	RS3	8.34	7.94	32	28	126	<0.01	N/A	HB

<sup>1</sup> 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	24.700
2	9	10	21.000	30.000	24.600
3	12% Effluent	10	23.000	27.000	25.100
4	16% Effluent	10	22.000	28.000	24.600
5	21% Effluent	10	20.000	29.000	24.600
6	28% Effluent	10	22.000	29.000	25.600

Summary Statistics on Transformed Data Table 2 of 2

Grp	Identification	Variance	Sd	Sem	C.V.%
1	Control	4.900	2.214	0.700	8.96
2	9	7.600	2.757	0.872	11.21
3	12% Effluent	2.322	1.524	0.482	6.07
4	16% Effluent	3.156	1.776	0.562	7.22
5	21% Effluent	8.489	2.914	0.921	11.84
6	28% Effluent	5.600	2.366	0.748	9.24

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	3	14	25	14	4

Calculated Chi-Square goodness of fit test statistic = 0.4849  
 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 = 5.05

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	8.333	1.667	0.312
Within (Error)	54	288.600	5.344	
Total	59	296.933		

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 Calculated In Original Units	T Stat	Sig
1	Control	24.700	24.700		
2	9	24.600	24.600	0.097	
3	12% Effluent	25.100	25.100	-0.387	
4	16% Effluent	24.600	24.600	0.097	
5	21% Effluent	24.600	24.600	0.097	
6	28% Effluent	25.600	25.600	-0.871	

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

**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	10			
2	9	10	2.388	9.7	0.100
3	12% Effluent	10	2.388	9.7	-0.400
4	16% Effluent	10	2.388	9.7	0.100
5	21% Effluent	10	2.388	9.7	0.100
6	28% Effluent	10	2.388	9.7	-0.900

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

CLIENT	Little Rock WRA, Adams Field WRF	SAMPLE TYPE	24 Hour Composite
NPDES #	AR0021806	DATE COLLECTED	03/08/23 03/10/23 03/13/23
LAB ID #	34940	DATE RECEIVED	03/09/23 03/10/23 03/13/23
TEST TYPE	7 Day Chronic	BEGIN DATE/TIME	03/09/23 1440
TEST ORGANISM	<i>Pimephales promelas</i>	END DATE/TIME	03/16/23 1440
ORGANISM AGE	< 24-Hours	TEST TEMPERATURE (°C)	25 ± 1
ORGANISM SOURCE	In House	PHOTO PERIOD	16-hr. Light 8-hr. Dark
RECEIVING WATER	Arkansas River	LIGHT INTENSITY	50-100 ft. cndl.
DILUTION WATER	Arkansas River	TECHNICIAN	H. Bohanan

**SURVIVAL SUMMARY**

Conc.	03/10/23					03/11/23					03/12/23					03/13/23					03/14/23									
	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					
PCON	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
TCON	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
9%	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
12%	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
16%	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
21%	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
28%	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.	03/15/23					03/16/23					x % Survival	C.V. %
	A	B	C	D	E	A	B	C	D	E		
PCON	8	8	8	8	8	8	8	8	8	8	100.0	0.00
TCON	8	8	8	8	8	8	8	8	8	8	100.0	0.00
9%	8	8	8	8	8	8	8	8	8	8	100.0	0.00
12%	8	8	8	8	8	8	8	8	8	8	100.0	0.00
16%	8	8	8	8	8	8	8	8	8	8	100.0	0.00
21%	8	8	8	8	8	8	8	8	8	8	100.0	0.00
28%	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.%
PCON	0.4250	0.4670	0.4720	0.4150	0.4860	0.4530	6.87
TCON	0.4450	0.4150	0.4590	0.4270	0.4350	0.4362	3.86
9%	0.4760	0.4820	0.4150	0.4460	0.3920	0.4422	8.76
12%	0.4830	0.4060	0.4490	0.4820	0.4650	0.4570	6.95
16%	0.4370	0.4820	0.4160	0.4650	0.4520	0.4504	5.64
21%	0.4670	0.4880	0.4030	0.4570	0.4620	0.4554	6.93
28%	0.4920	0.4110	0.4650	0.4530	0.4760	0.4594	6.67

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

Little Rock, Adams Field

Lab ID# 34940

Test Date: March 9, 2023

**WET CHEMISTRY MEASUREMENTS**

Date	Time	Temp	Samp. No.	pH of Solution						Analyst	
				PCON	TCON	9%	12%	16%	21%		28%
03/09/23	Start	25.0	1	8.02	7.47	7.29	7.22	7.19	7.19	7.20	JP
03/10/23	24 Hr.	24.1	1	7.97	7.82	7.61	7.55	7.52	7.53	7.55	JP
03/10/23	Renew	25.0	1	8.19	7.68	7.52	7.48	7.48	7.46	7.51	JP
03/11/23	48 Hr.	24.0	1	8.15	7.61	7.41	7.34	7.26	7.21	7.18	JP
03/11/23	Renew	25.0	2	8.22	7.53	7.29	7.19	7.13	7.09	7.09	JP
03/12/23	72 Hr.	24.0	2	8.14	7.78	7.38	7.24	7.15	7.09	7.07	AS
03/12/23	Renew	25.0	2	7.22	7.29	7.14	7.11	7.12	6.98	7.11	AS
03/13/23	96 Hr.	23.4	2	8.64	8.56	8.03	7.81	7.70	7.66	7.60	RP
03/13/23	Renew	25.0	2	8.53	8.26	7.80	7.51	7.42	7.38	7.34	RP
03/14/23	120 Hr.	23.9	2	7.76	8.19	8.42	8.55	7.85	7.63	7.43	HB
03/14/23	Renew	25.0	3	8.02	8.34	8.51	8.16	7.74	7.52	7.40	HB
03/15/23	144 Hr.	24.0	3	8.61	8.54	8.04	8.12	7.54	7.39	7.36	RP
03/15/23	Renew	25.0	3	8.36	8.43	8.01	7.79	7.62	7.48	7.41	RP
03/16/23	168 Hr.	24.0	3	8.55	7.87	7.90	7.93	7.93	7.92	7.91	JP

Date	Time	Temp	Samp. No.	DO (mg/L) of Solution						Analyst	
				PCON	TCON	9%	12%	16%	21%		28%
03/09/23	Start	25.0	1	7.07	7.82	7.84	8.64	8.47	8.34	8.41	JP
03/10/23	24 Hr.	24.1	1	8.64	8.19	8.60	8.11	8.48	7.87	8.45	JP
03/10/23	Renew	25.0	1	8.42	8.57	7.95	8.52	7.96	8.51	7.36	JP
03/11/23	48 Hr.	24.0	1	8.39	8.25	8.31	8.24	8.22	7.62	8.07	JP
03/11/23	Renew	25.0	2	8.12	7.91	7.86	8.18	7.15	7.85	8.31	JP
03/12/23	72 Hr.	24.0	2	7.70	8.62	8.53	8.47	8.48	8.46	8.64	AS
03/12/23	Renew	25.0	2	8.49	7.71	7.79	7.78	7.81	8.35	8.63	AS
03/13/23	96 Hr.	23.4	2	8.62	8.50	8.56	7.68	7.68	7.81	8.53	RP
03/13/23	Renew	25.0	2	8.13	7.91	7.86	8.30	7.86	7.79	7.93	RP
03/14/23	120 Hr.	23.9	2	7.81	7.83	7.29	8.27	8.29	8.36	8.43	HB
03/14/23	Renew	25.0	3	7.52	7.94	7.80	7.67	7.96	8.21	8.40	HB
03/15/23	144 Hr.	24.0	3	7.28	8.02	7.66	7.89	7.84	8.54	8.06	RP
03/15/23	Renew	25.0	3	7.30	8.18	8.32	8.20	8.36	8.34	8.34	RP
03/16/23	168 Hr.	24.0	3	7.54	8.15	7.77	7.45	8.40	8.24	7.53	JP

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

Little Rock, Adams Field

Lab ID# 34940

Test Date: March 9, 2023

**INITIAL CHEMISTRY MEASUREMENTS @ 100% EFFLUENT**

Date	Samp. No.	pH <sup>1</sup>	DO <sup>1</sup>	Hardness mg/L CaCO <sub>3</sub> <sup>1</sup>	Alkalinity mg/L CaCO <sub>3</sub> <sup>1</sup>	Conduct. μS/cm <sup>1</sup>	Resid.Cl <sub>2</sub> mg/L <sup>1</sup>	Dechlor(mL) Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> mg/L <sup>1</sup>	Analyst
03/09/23	1	7.45	7.74	28	70	278	<0.01	N/A	JP
03/11/23	2	7.04	7.43	32	66	228	<0.01	N/A	JP
03/14/23	3	7.10	7.36	24	58	237	<0.01	N/A	HB

**INITIAL CHEMISTRY MEASUREMENTS @ RECEIVING WATER**

Date	Samp. No.	pH <sup>1</sup>	DO <sup>1</sup>	Hardness mg/L CaCO <sub>3</sub> <sup>1</sup>	Alkalinity mg/L CaCO <sub>3</sub> <sup>1</sup>	Conduct. μS/cm <sup>1</sup>	Resid.Cl <sub>2</sub> mg/L <sup>1</sup>	Dechlor(mL) Na <sub>2</sub> S <sub>2</sub> O <sub>3</sub> mg/L <sup>1</sup>	Analyst
03/09/23	RS1	7.47	7.82	32	28	125	<0.01	N/A	JP
03/11/23	RS2	7.53	7.91	32	28	124	<0.01	N/A	JP
03/14/23	RS3	8.34	7.94	32	28	126	<0.01	N/A	HB

<sup>1</sup> 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	0.415	0.459	0.436
2	9% Effluent	5	0.392	0.482	0.442
3	12% Effluent	5	0.406	0.483	0.457
4	16% Effluent	5	0.416	0.482	0.450
5	21% Effluent	5	0.403	0.488	0.455
6	28% Effluent	5	0.411	0.492	0.459

Summary Statistics on Transformed Data Table 2 of 2

Grp	Identification	Variance	Sd	Sem	C.V.%
1	Control	0.000	0.017	0.008	3.86
2	9% Effluent	0.002	0.039	0.017	8.76
3	12% Effluent	0.001	0.032	0.014	6.95
4	16% Effluent	0.001	0.025	0.011	5.64
5	21% Effluent	0.001	0.032	0.014	6.93
6	28% Effluent	0.001	0.031	0.014	6.67

Shapiro - Wilk's Test For Normality

D = 0.021

W = 0.924

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 = 2.51

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	0.002	0.000	0.467
Within (Error)	24	0.021	0.001	
Total	29	0.024		

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		T Stat	Sig
			Original Units	Calculated In		
1	Control	0.436	0.436			
2	9% Effluent	0.442	0.442		-0.317	
3	12% Effluent	0.457	0.457		-1.099	
4	16% Effluent	0.450	0.450		-0.750	
5	21% Effluent	0.455	0.455		-1.015	
6	28% Effluent	0.459	0.459		-1.226	

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 Sig		Difference from Control
			Diff (In Orig. Units)	% of Control	
1	Control	5			
2	9% Effluent	5	0.045	10.2	-0.006
3	12% Effluent	5	0.045	10.2	-0.021
4	16% Effluent	5	0.045	10.2	-0.014
5	21% Effluent	5	0.045	10.2	-0.019
6	28% Effluent	5	0.045	10.2	-0.023

**APPENDIX A  
RAW DATA**

7-DAY CERIODAPHNIA DUBIA SURVIVAL & REPRODUCTION

DAILY RAW DATA TABLE

PAGE 1 OF 2

CLIENT Little Rock - Adams Field

START DATE/TIME 3-9-23 TG 1515

OUTFALL 001

END DATE/TIME 3-16-23 MH 1515

LAB ID # 34940

Pcon

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
3/10	A	A	A	A	A	A	A	A	A	A	MH	1515
3/11	A	A	A	A	A	A	A	A	A	A	JC	1148
3/12	A	A	A	A	A	A	A	A	A	A	JC	1330
3/13	4	3	2	4	5	3	2	4	4	4	TG	1330
3/14	A	A	A	A	A	A	A	A	A	A	MH	1545
3/15	9	10	8	8	6	7	9	9	6	9	MH	1000
3/16	14	12	13	12	12	12	13	14	13		MH	1515
	27	25	23	24	23	22	23	26	24	26		

$\bar{x}$  # Young w/o Dead = 24.3 CV% = 6.73

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

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

Tcon

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
3/10	A	A	A	A	A	A	A	A	A	A	MH	1515
3/11	A	A	A	A	A	A	A	A	A	A	JC	1148
3/12	A	A	A	A	A	A	A	A	A	A	JC	1330
3/13	5	2	2	5	3	4	2	3	4	2	TG	1330
3/14	A	A	A	A	A	A	A	A	A	A	MH	1545
3/15	11	11	8	7	8	10	6	8	9	8	MH	1000
3/16	13	12	14	13	14	12	13	13	13	12	MH	1515
	29	25	24	25	25	26	21	24	26	22		

$\bar{x}$  # Young w/o Dead = 24.7 CV% = 8.96

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

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

9

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
3/10	A	A	A	A	A	A	A	A	A	A	MH	1515
3/11	A	A	A	A	A	A	A	A	A	A	JC	1148
3/12	A	A	A	A	A	A	A	A	A	A	JC	1330
3/13	4	2	3	2	5	3	2	4	3	4	TG	1330
3/14	A	A	A	A	A	A	A	A	A	A	MH	1545
3/15	9	6	9	6	11	10	10	9	7	8	MH	1000
3/16	13	13	13	13	14	12	12	13	12	14	MH	1515
	26	21	25	21	30	25	24	26	22	26		

$\bar{x}$  # Young w/o Dead = 24.6 CV% = 11.21

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

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

12

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
3/10	A	A	A	A	A	A	A	A	A	A	MH	1515
3/11	A	A	A	A	A	A	A	A	A	A	JC	1148
3/12	A	A	A	A	A	A	A	A	A	A	JC	1330
3/13	4	2	2	2	3	5	3	2	5	3	TG	1330
3/14	A	A	A	A	A	A	A	A	A	A	MH	1545
3/15	9	7	9	11	7	10	8	10	10	10	MH	1000
3/16	14	14	13	12	13	12	14	13	12	12	MH	1515
	27	23	24	25	23	27	25	25	27	25		

$\bar{x}$  # Young w/o Dead = 25.1 CV% = 6.07

$\bar{x}$  # 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 Little Rock-Adams Field  
OUTFALL 001  
LAB ID # 34940

START DATE/TIME 3-9-23 TG 1515  
END DATE/TIME 3-16-23 MH 1515

16

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
3/10	A	A	A	A	A	A	A	A	A	A	MH	1515
3/11	A	A	A	A	A	A	A	A	A	A	Jc	1145
3/12	A	A	A	A	A	A	A	A	A	A	Jc	1330
3/13	4	2	3	5	3	5	4	2	3	4	TG	1330
3/14	A	A	A	A	A	A	A	A	A	A	MH	1545
3/15	9	8	8	6	10	11	6	10	8	7	MH	1000
3/16	12	14	13	14	14	12	12	12	12	13	MH	1515
	25	24	24	25	27	28	22	24	23	24		

$\bar{x}$  # Young w/o Dead = 24.6      CV% = 7.22  
 $\bar{x}$  # Young w/Dead =              CV% =  
 $\bar{x}$  % Survival = 100              CV% = 0.00

21

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
3/10	A	A	A	A	A	A	A	A	A	A	MH	1515
3/11	A	A	A	A	A	A	A	A	A	A	Jc	1145
3/12	A	A	A	A	A	A	A	A	A	A	Jc	1330
3/13	5	2	3	2	5	3	3	4	3	2	TG	1330
3/14	A	A	A	A	A	A	A	A	A	A	MH	1545
3/15	8	7	9	9	10	10	9	11	7	6	MH	1000
3/16	13	12	12	13	13	14	12	14	13	12	MH	1515
	26	21	24	24	28	27	24	29	23	20		

$\bar{x}$  # Young w/o Dead = 24.6      CV% = 11.84  
 $\bar{x}$  # Young w/Dead =              CV% =  
 $\bar{x}$  % Survival = 100              CV% = 0.00

28

Date	Rep1	Rep2	Rep3	Rep4	Rep5	Rep6	Rep7	Rep8	Rep9	Rep10	Analyst	Time
3/10	A	A	A	A	A	A	A	A	A	A	MH	1515
3/11	A	A	A	A	A	A	A	A	A	A	Jc	1145
3/12	A	A	A	A	A	A	A	A	A	A	Jc	1330
3/13	4	2	3	5	3	2	2	5	4	5	TG	1330
3/14	A	A	A	A	A	A	A	A	A	A	MH	1545
3/15	10	7	7	7	8	10	9	8	11	11	MH	1000
3/16	14	13	14	14	14	12	13	12	14	13	MH	1515
	28	22	24	26	25	24	24	25	29	29		

$\bar{x}$  # Young w/o Dead = 25.6      CV% = 9.24  
 $\bar{x}$  # 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% =

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

CLIENT/FACILITY: Little Rock - Adams Field DATE/TIME STARTED: 3-9-23 NB 1440  
 OUTFALL #: 001 PROJECT #: 34940 DATE/TIME ENDED: 3-16-23 RR 1440  
 ORGANISM ID#: PP0-23-067

Cont.	3-10-23 NB 1440					3-11-23 RR 1020					3-12-23 RR 1000					3-13-23 NB 0950					3-14-23 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					
Pcon	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
Tcon	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
9	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
12	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
16	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
21	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

Cont.	3-15-23 JC 1228					3-16-23 RR 1440					C.V.S				
	A	B	C	D	E	A	B	C	D	E	Mean Survival	C.V.S			
Pcon	8	8	8	8	8	8	8	8	8	8	100.0	0.00			
Tcon	8	8	8	8	8	8	8	8	8	8	100.0	0.00			
9	8	8	8	8	8	8	8	8	8	8	100.0	0.00			
12	8	8	8	8	8	8	8	8	8	8	100.0	0.00			
16	8	8	8	8	8	8	8	8	8	8	100.0	0.00			
21	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			



**APPENDIX B  
REFERENCE TOXICANTS**

**CHRONIC REFERENCE TOXICANT TEST RESULTS**

SPECIES: *Ceriodaphnia dubia*  
 CHEMICAL: Sodium Chloride  
 DURATION: 7-Days  
 TEST NUMBER: 3  
 TEST DATE: 03/02/23 - 03/09/23  
 0915 Hrs - 0915 Hrs  
 STATISTICAL METHOD: Dunnetts/Steels

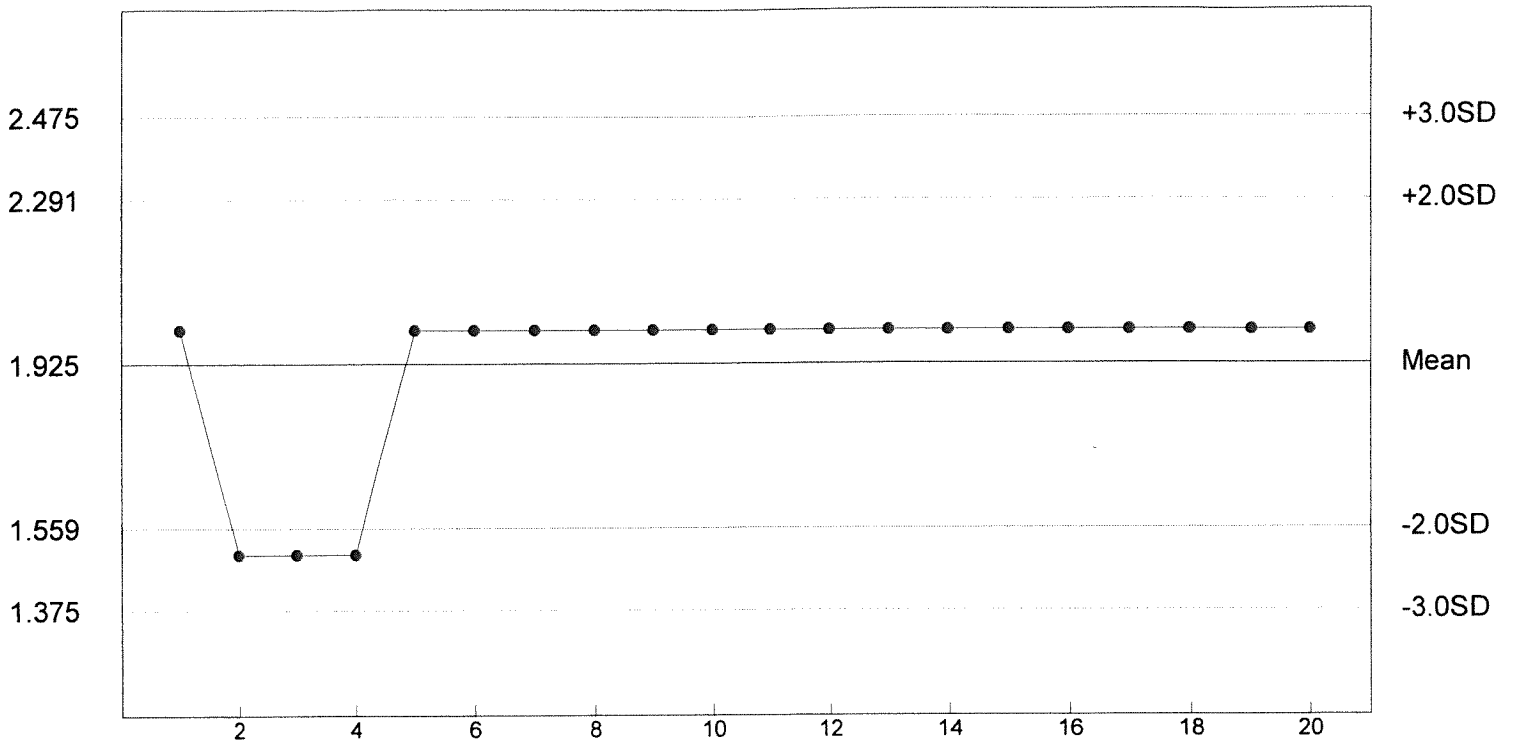
CONCENTRATION (g/L)	NUMBER EXPOSED	NUMBER DEAD
0.5	10	0
1.0	10	0
1.5	10	0
2.0	10	0
2.5	10	10
3.0	10	10
4.0	10	10

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



Reference Tox Sodium Chloride g/L

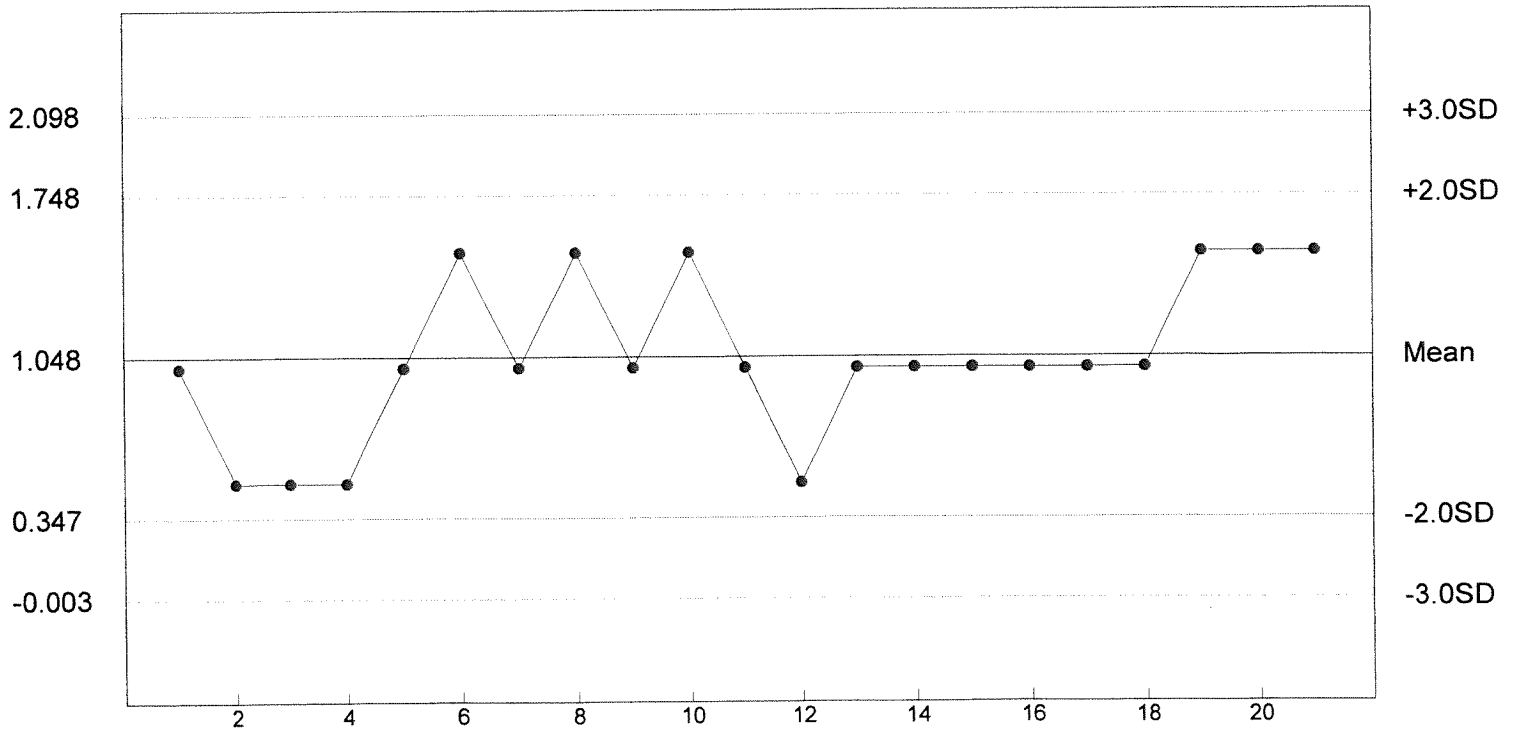
C. dubia Survival - NOEC



n= 20 Mean= 1.925 SD= 0.183 CV= 9.52% Min= 1.500 Max= 2.000

Reference Tox Sodium Chloride g/L

C. dubia Reproduction - NOEC



n= 21 Mean= 1.048 SD= 0.350 CV= 33.43% Min= 0.500 Max= 1.500

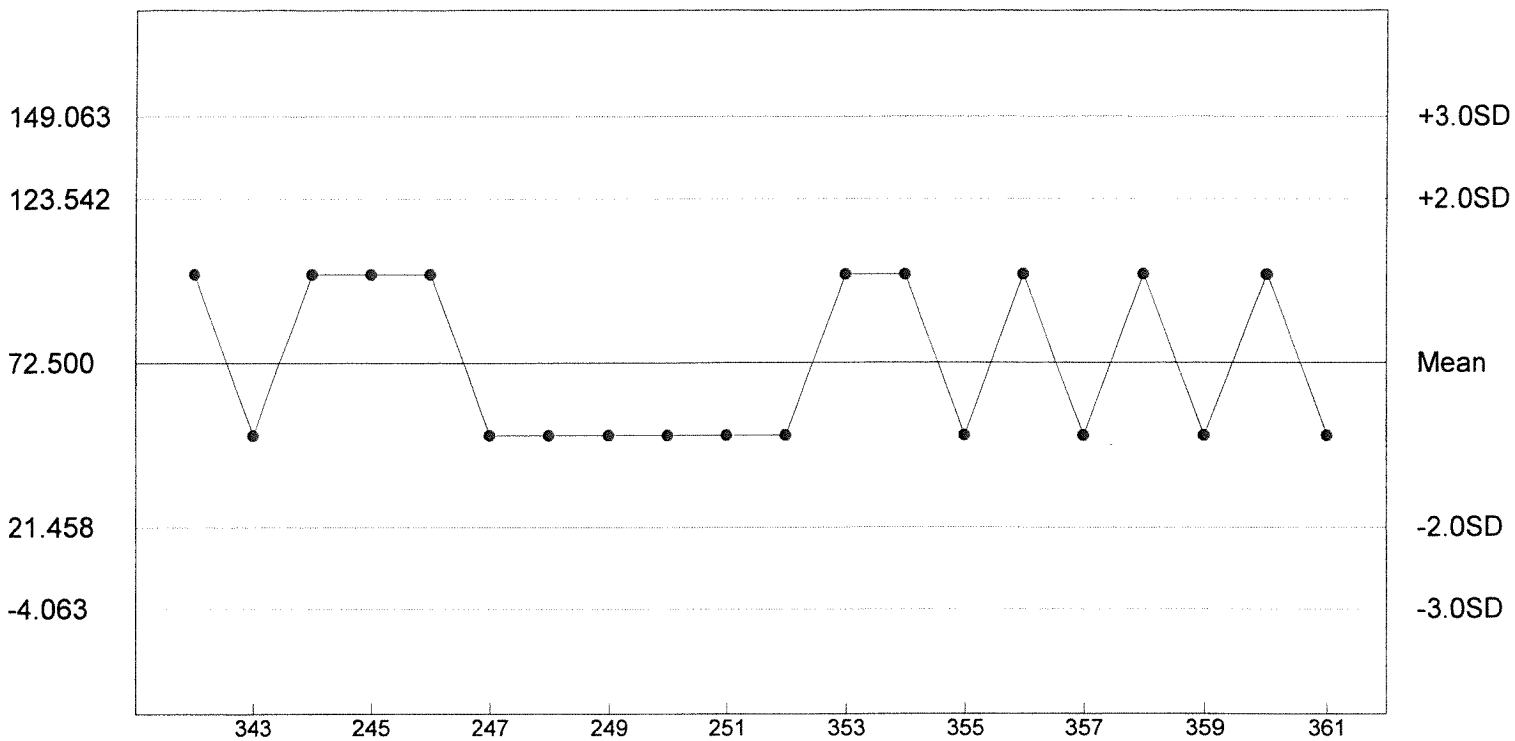
**CHRONIC REFERENCE TOXICANT TEST RESULTS**

SPECIES: *Pimephales promelas*  
 CHEMICAL: Copper Nitrate  
 DURATION: 7-Days  
 TEST NUMBER: 3  
 TEST DATE: 03/02/23 - 03/09/23  
 1300 Hrs -1300 Hrs  
 STATISTICAL METHOD: Dunnetts/Steels

CONCENTRATION (ug/L)	NUMBER EXPOSED	NUMBER DEAD
12.5	40	0
25	40	0
50	40	0
100	40	13
200	40	27
400	40	40
800	40	40

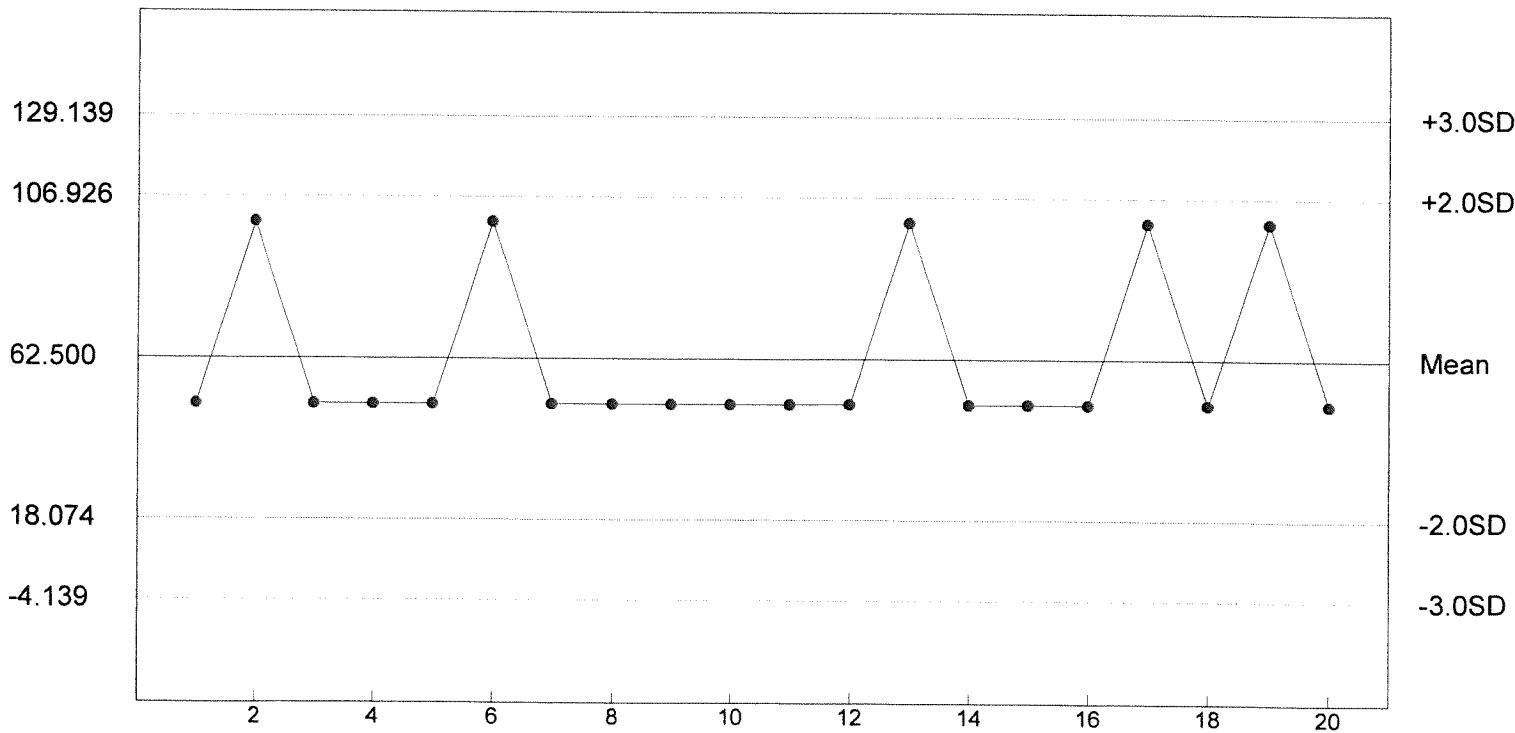
LOEC FOR SURVIVAL	NOEC FOR SURVIVAL	LOEC FOR GROWTH	NOEC FOR GROWTH
<b>100 ug/L</b>	<b>50 ug/L</b>	<b>100 ug/L</b>	<b>50 ug/L</b>

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

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

**APPENDIX C**  
**CHAIN OF CUSTODY SHEETS**

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

CHAIN OF CUSTODY RECORD

PROJECT # 34940 PROJECT NAME Little Rock - Adams Field PERMIT# AR 0021806

OUTFALL SAMPLES

24-Hr Flow Weighted Composite  Other \_\_\_\_\_

OUTFALL NUMBER	PERSON TAKING SAMPLE	START DATE/TIME	END DATE/TIME	# OF PORTIONS COMPOSITED	METHODS OF COLLECTION AND COMPOSITE			# OF CONTAINERS TO BE SHIPPED
					AUTO COLL. AUTO COMP.	MANUAL COLL. MANUAL COMP.	AUTO COLL. MANUAL COMP.	
005-005 AFTP Final Effluent	Brian Daley	3/7/23 12:00pm	3/9/23 10:00am	12			X	1

RECEIVING WATER SAMPLES

SAMPLE IDENTIFICATION (FOR REC'NG) H <sub>2</sub> O GRABS, GIVE NAME OF STREAM AND LOCATION	PERSON TAKING SAMPLE	DATE	TIME	# OF CONTAINERS TO BE SHIPPED
080-002 AR UPstream of Outfall	Brian Daley	3-8-23	10:12am	1

TYPE OF TEST 7 day CLF  
 NAME OF RECEIVING WATER Arkansas River  
 DILUTION WATER USED FOR THIS TEST RS  
\* Samples Shipped by Courier

RELINQUISHED BY: Brian Daley DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ RECEIVED BY AT THIS DATE/TIME: \_\_\_\_\_  
 RELINQUISHED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ RECEIVED BY AT THIS DATE/TIME: \_\_\_\_\_  
 RELINQUISHED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ RECEIVED BY AT THIS DATE/TIME: \_\_\_\_\_  
 METHOD OF SHIPMENT: Greyhound Pick Up \_\_\_\_\_ Client Delivered \_\_\_\_\_ Other Courier

RECEIVED: Matt Jorner DATE: 3-9-23 TIME: 1000 SAMPLE TEMP. @ RECEIPT: 2.6  
 1ST PAGE - LAB COPY 2ND PAGE - FACILITY COPY IR1

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

CHAIN OF CUSTODY RECORD

PROJECT # 34940 PROJECT NAME Little Rock - Adams Field PERMIT# AR 21806

OUTFALL SAMPLES

24-Hr Flow Weighted Composite  Other \_\_\_\_\_

OUTFALL NUMBER	PERSON TAKING SAMPLE	START DATE/TIME	END DATE/TIME	# OF PORTIONS COMPOSITED	METHODS OF COLLECTION AND COMPOSITE			# OF CONTAINERS TO BE SHIPPED
					AUTO COLL. AUTO COMP.	MANUAL COLL. MANUAL COMP.	AUTO COLL. MANUAL COMP.	
005-006 AF FINAL EFF.	J. B. [Signature]	3-9-23 9:00AM	3-10-23 7:00AM	12			X	1

RECEIVING WATER SAMPLES

SAMPLE IDENTIFICATION (FOR REC'NG) H <sub>2</sub> O GRABS, GIVE NAME OF STREAM AND LOCATION	PERSON TAKING SAMPLE	DATE	TIME	# OF CONTAINERS TO BE SHIPPED
080-002 RIVER SAMPLE UPSTREAM OF OUTFALL	J. B. [Signature]	3-8-23	10:12AM	1

TYPE OF TEST 7 day ClF  
 NAME OF RECEIVING WATER Arkansas River  
 DILUTION WATER USED FOR THIS TEST RS  
 \* PICKED UP BY COURIER (ARKANSAS BEST COURIERS)

RELINQUISHED BY: J. B. [Signature] DATE: 3-10-23 TIME: 10:12AM RECEIVED BY AT THIS DATE/TIME: [Signature]  
 RELINQUISHED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ RECEIVED BY AT THIS DATE/TIME: \_\_\_\_\_  
 RELINQUISHED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ RECEIVED BY AT THIS DATE/TIME: \_\_\_\_\_  
 METHOD OF SHIPMENT: Greyhound Pick Up \_\_\_\_\_ Client Delivered \_\_\_\_\_ Other Courier

RECEIVED: [Signature] DATE: 3-10-23 TIME: 1430 SAMPLE TEMP. @ RECEIPT: 74.2.5

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

CHAIN OF CUSTODY RECORD

PROJECT # 34940 PROJECT NAME Little Rock- Adams Field PERMIT# AR 0021806

OUTFALL SAMPLES

24-Hr Flow Weighted Composite  Other

OUTFALL NUMBER	PERSON TAKING SAMPLE	START DATE/TIME	END DATE/TIME	# OF PORTIONS COMPOSITED	METHODS OF COLLECTION AND COMPOSITE			# OF CONTAINERS TO BE SHIPPED
					AUTO COLL. AUTO COMP.	MANUAL COLL. MANUAL COMP.	AUTO COLL. MANUAL COMP.	
005-AEFF.	J. Bunk	3-12-23 9:00 AM	3-13-23 7:00 AM	12			X	1

RECEIVING WATER SAMPLES

SAMPLE IDENTIFICATION (FOR REC'G) H <sub>2</sub> O GRABS, GIVE NAME OF STREAM AND LOCATION	PERSON TAKING SAMPLE	DATE	TIME	# OF CONTAINERS TO BE SHIPPED
080 - RIVER SAMPLE UPSTREAM OF OUTFALL	J. Bunk	3-8-23	10:12 AM	1

TYPE OF TEST 7 day ClF  
 NAME OF RECEIVING WATER Arkansas River  
 DILUTION WATER USED FOR THIS TEST RS  
 SHIPPED BY ARKANSAS BEST COURIER

RELINQUISHED BY: J. Bunk DATE: 3-13-23 TIME: ⊗ RECEIVED BY AT THIS DATE/TIME \_\_\_\_\_  
 RELINQUISHED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ RECEIVED BY AT THIS DATE/TIME \_\_\_\_\_  
 RELINQUISHED BY: \_\_\_\_\_ DATE: \_\_\_\_\_ TIME: \_\_\_\_\_ RECEIVED BY AT THIS DATE/TIME \_\_\_\_\_  
 METHOD OF SHIPMENT: Greyhound Arroyo Pick Up \_\_\_\_\_ Client Delivered \_\_\_\_\_ Other Courier / Client  
 RECEIVED: \_\_\_\_\_ DATE: 3-13-23 TIME: 1340 SAMPLE TEMP. @ RECEIPT. TRI 17

**LITTLE ROCK WATER RECLAMATION AUTHORITY  
 ADAMS FIELD WATER RECLAMATION FACILITY  
 PERMIT NO. NPDES AR0021806  
 OUTFALL 001  
 TEST DATE: 03/09/23  
 FOR NET DMR**

<b>I. <i>Ceriodaphnia dubia</i></b>	<b>Response</b>
a. If the NOEC for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0". <b>Parameter No. TLP3B.</b>	0
b. Report the NOEC value for survival, <b>Parameter No. TOP3B.</b>	28%
c. Report the NOEC value for reproduction, <b>Parameter No. TPP3B.</b>	28%
d. If the NOEC for reproduction is less than the critical dilution, enter a "1"; otherwise, enter a "0". <b>Parameter No. TGP3B.</b>	0
e. Report the higher coefficient of variation (critical dilution or control), <b>Parameter No. TQP3B.</b>	11.84%
<b>II. <i>Pimephales promelas</i></b>	<b>Response</b>
a. If the No Observed Effect Concentration (NOEC) for survival is less than the critical dilution, enter a "1"; otherwise, enter a "0". <b>Parameter No. TLP6C.</b>	0
b. Report the NOEC value for survival, <b>Parameter No. TOP6C.</b>	28%
c. Report the NOEC value for growth, <b>Parameter No. TPP6C.</b>	28%
d. If the No Observed Effect Concentration (NOEC) for growth is less than the critical dilution, enter a "1"; otherwise, enter a "0". <b>Parameter No. TGP6C.</b>	0
e. Report the highest coefficient of variation (critical dilution or control) <b>Parameter No. TQP6C.</b>	6.93%
<b><i>Ceriodaphnia dubia</i></b>	
22415 Retest Number 1 ( <i>For 9: First column param. NODI pulldown menu, highlight "9"</i> )	9
22416 Retest Number 2 ( <i>For 9: First column param. NODI pulldown menu, highlight "9"</i> )	9
51443 Retest Number 3 ( <i>For 9: First column param. NODI pulldown menu, highlight "9"</i> )	9
<b><i>Pimephales promelas</i></b>	
22418 Retest Number 1 ( <i>For 9: First column param. NODI pulldown menu, highlight "9"</i> )	9
22419 Retest Number 2 ( <i>For 9: First column param. NODI pulldown menu, highlight "9"</i> )	9
51444 Retest Number 3 ( <i>For 9: First column param. NODI pulldown menu, highlight "9"</i> )	9

**In comment box at bottom left:** 9 = No retests required.