



Ecotoxicology Research Facility



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August 16, 2018

Jonathan Kopp  
Walnut Ridge Wastewater Treatment Plant  
216 Southwest 4<sup>th</sup> Street  
Walnut Ridge, AR 72476

Dear Jon,

Please find enclosed the results of the 7-day chronic tests using water collected from Walnut Ridge's plant facilities beginning during the week of July 30, 2018. No lethal or sublethal effects were measured to *Pimephales promelas* or *Ceriodaphnia dubia* exposed to the critical flow concentration (100%) or other treated dilutions from this outfall.

All test conditions and acceptability criteria as suggested by our laboratory and the US EPA were met during these tests.

Please call if you have any questions regarding this particular test or any other tests conducted in the past.

Sincerely,

Jennifer L. Bouldin, PhD  
Director Ecotoxicology Research Facility  
PO Box 599  
Arkansas State University  
State University, AR 72467

**Arkansas State University Ecotoxicology Research Facility**

**Laboratory Report**

Facility Director / Lab Contact: Jennifer Bouldin  
 Phone: (870) 972-2570

Client: Walnut Ridge Wastwater Treatment  
 216 Southwest 4th Street  
 Walnut Ridge, AR 72476

Contact: Jon Knopp  
 870-866-2312

NPDES Permit #: AR0046566 AFIN#: 38-00040  
 Effluent Sampling Point/Type: 24hr Composite

Samples Collected:

Sample #	Sampling times				Received	Arrival Temp
1	07/29/18	0900 hrs to	07/30/18	0900 hrs	07/30/18 1045am	4.0 °C
2	07/31/18	0900 hrs to	08/01/18	0900 hrs	08/01/18 1111am	1.9 °C
3	08/02/18	0900 hrs to	08/03/18	0900 hrs	08/03/18 1132am	1.1 °C

**Test Methods:**

7-Day Chronic Toxicity, Static renewal, Cladoceran, EPA 821/R-02/013, Section 13  
 7-Day Chronic Toxicity, Static renewal, Fathead minnow, EPA 821/R-02/013, Section 11

Organisms: *C. dubia* <24hrs, *P. promelas* <24hrs Culture Source: ASU Ecotox  
 Dilutions: 0%, 32%, 42%, 56%, 80%, 100% Critical Dilution: 100%  
 Statistical Method: CETIS v1.9

<i>C. dubia</i>			<i>P. promelas</i>		
whole effluent toxicity			whole effluent toxicity		
	lethality	sublethality		lethality	sublethality
DMR Code	22414 10	22414 P0	DMR Code	22414 10	22414 P0
Result	100%	100%	Result	100%	100%
DMR Code	lethality TLP3B	sublethality TGP3B	DMR Code	lethality TLP6C	sublethality TGP6C
Result	0	0	Result	0	0
DMR Code	NOEC lethality TOP3B	NOEC sublethal TPP3B	DMR Code	NOEC lethality TOP6C	NOEC sublethal TPP6C
Result	100%	100%	Result	100%	100%
DMR Code	CV% TQP3B		DMR Code	CV% TQP6C	
Result	28.0%		Result	8.8%	
	control survival 100%	control mean reproduction 29.4		control survival 100%	control mean weight 0.3472
	critical dil. survival 100%	critical mean reproduction 46.0		critical dil. survival 100%	critical mean weight 0.3780
		MSDp 0.4231			MSDp 0.1531

**Results Summary:** No lethal nor sublethal effects were measured to *P. promelas* or *C. dubia* at any effluent concentrations.

**QA/Reference Testing:** Data attached

**Reviewed By:**

  
 Jennifer L. Bouldin, Director ASU Ecotoxicology Research Facility

Toxicity Test Performed: 7-day *Ceriodaphnia dubia* Survival and Reproduction  
 Effluent Sampling Point: Walnut Ridge WWT Plant  
 Date Test Started: 07/30/18 *C. dubia*  
 Time Test Started: 1420 *C. dubia*  
 Date Test Terminated: 08/06/18 *C. dubia*  
 Time Test Terminated: 1420 *C. dubia*  
 Laboratory Analyst: Martin/Alves-Augusto

Toxicity Test Performed: 7-day *Pimephales promelas* Survival and Growth  
 Effluent Sampling Point: Walnut Ridge WWT Plant  
 Date Test Started: 07/30/18 *P. promelas*  
 Time Test Started: 1435 *P. promelas*  
 Date Test Terminated: 8/06/18 *P. promelas*  
 Time Test Terminated: 1430 *P. promelas*  
 Laboratory Analyst: Atwell/Alves-Augusto

## I. Test Methods

### A. Physical and Chemical Testing - APHA, Standard Methods for the Examination of Water and Wastewater; Vol. 21, 2005.

<u>Test</u>	<u>Method</u>
Alkalinity	2320B
Conductivity	2510B
Dissolved Oxygen (mg/L, DO)	4500-O-G
Hardness (mg/L CaCO <sub>3</sub> )	2340C
pH	4500-H <sup>+</sup> B
Temperature (°C)	2550B

### B. Toxicity Testing – EPA 821/R-02/013: Short Term Methods for Estimating the Chronic Toxicity of Effluents to Freshwater Organisms

<u>Test</u>	<u>Method</u>
Cladoceran Survival and Reproduction	Section 13
Fathead Minnow Survival and Growth	Section 11

## II. Test Organisms

- A. Name: *Ceriodaphnia dubia* (Cladoceran)  
 Source: Laboratory Culture  
 Age: <24 hours  
 Life Stage: Neonate

B. Name: *Pimephales promelas* (Fathead minnow)

Source: Laboratory Culture

Age: &lt;24 hours

Life Stage: Larval

## III. External Factors

## A. Incubator

Temperature (°C)

Average: 25.0

Range: 25.0 – 25.1

Light Cycle: 16 hours light/ 8 hours dark

Light Intensity: 100 footcandles

Control Water: Moderately Hard Synthetic Water (#MH 1022/1023)

B. *Ceriodaphnia dubia*

Test Chambers: 30 ml Solo cups

Volume per Chamber: 15-20 ml

Number of Organisms per Chamber: 1

Number of Replicates per Concentration: 10

Acclimation: Laboratory control water was added to cultures until &gt;50% of the culture water consisted of control water.

Food: Cladocera were fed *Selenastrum* (#ABS 052818) and yeast/cereal/trout chow mix (#YCT-070318) one hour prior to test setup and once daily thereafter.C. *Pimephales promelas*

Test Chambers: 250 ml storage dishes

Volume per Chamber: 200 ml

Number of Organisms per Chamber: 8

Number of Replicates per Concentration: 5

Acclimation: Laboratory control water was added to cultures until &gt;50% of the culture water consisted of control water.

Food: Larval fish were fed 0.15ml of laboratory-cultured *Artemia* brine shrimp one hour prior to test setup and then 3X daily thereafter.

## IV. Quality Assurance

## A. Standard Toxicant: Sodium Chloride

B. Organism: *Ceriodaphnia dubia*

Date and time of Reference Toxicant Test

Start: 08/02/18

Terminated: 08/09/18

Time of Reference Toxicant Test

Start: 1240

Terminated: 1150

Laboratory Analyst: Martin

Dilution Water Used: Moderately Hard Synthetic Water #1022/1023

Results: Survival and Reproduction within control limits

Survival

LOEC: 2.60 g/L NaCl

EC50: 1.87 g/L NaCl

Reproduction

LOEC: 1.82 g/L NaCl

IC25: 1.49 g/L NaCl

C. Organism: *Pimephales promelas*

Date of Reference Toxicant Test

Start: 08/01/18

Terminated: 08/08/18

Time of Reference Toxicant Test

Start: 1630

Terminated: 1636

Laboratory Analyst: Martin

Dilution Water Used: Moderately Hard Synthetic Water #1022/1023

Results: Survival and Growth within control limits

Survival

LOEC: 4.22 g/L NaCl

EC50: 5.75 g/L NaCl

Growth

LOEC: 7.50 g/L NaCl

IC25: 4.55 g/L NaCl

V. Physical and Chemical Data - See Attached

VI. Survival and Growth Data - See Attached

VII. Statistical Methods - See Attached

VIII. NPDES Permit Results - See Attached

**SUMMARY REPORTING FORM**  
**WET Testing**  
***Ceriodaphnia dubia* Survival and Reproduction**

Permittee: Walnut Ridge WWT Plant

NPDES No.: AR0046566

		<u>Time</u>	<u>Date</u>		<u>Time</u>	<u>Date</u>
Composite 1:	Collected from	0900	07/29/18	to	0900	07/30/18
Composite 2:	Collected from	0900	07/31/18	to	0900	08/01/18
Composite 3:	Collected from	0900	08/02/18	to	0900	08/03/18
Test Initiated:	1420					Date: 07/30/18
Time Terminated:	1420					Date: 08/06/18
Dilution H <sub>2</sub> O: MH 1022/1023						

**PERCENT SURVIVAL**

<u>Time of Reading</u>	<u>Percent Effluent</u>					
	<u>Control</u>	<u>32%</u>	<u>42%</u>	<u>56%</u>	<u>80%</u>	<u>100%</u>
24h	100	100	100	100	100	100
48h	100	100	100	100	100	100
7 day	100	100	100	100	90	100

**NUMBER OF YOUNG/FEMALE @ 7 DAYS**

<u>REP</u>	<u>Percent Effluent</u>					
	<u>0%</u>	<u>32%</u>	<u>42%</u>	<u>56%</u>	<u>80%</u>	<u>100%</u>
<b>A</b>	48	36	7	38	X/8	40
<b>B</b>	29	37	65	32	62	59
<b>C</b>	24	41	44	22	41	60
<b>D</b>	28	56	39	56	38	0**
<b>E</b>	18	19	31	38	58	40
<b>F</b>	21	32	34	58	44	38
<b>G</b>	29	60	36	38	44	39
<b>H</b>	31	56	38	39	40	43
<b>I</b>	32	36	34	17	54	54
<b>J</b>	34	40	40	38	38	41
**Male						
<b>Mean</b>	<b>29.4</b>	<b>41.3</b>	<b>36.8</b>	<b>37.6</b>	<b>46.6</b>	<b>46.0</b>
<b>CV%*</b>	<b>28.0</b>	<b>30.7</b>	<b>38.5</b>	<b>33.8</b>	<b>19.5</b>	<b>19.6</b>

\*Coefficient of Variation% = Standard Deviation x 100/Mean

### ***Ceriodaphnia dubia* Survival and Reproduction**

1. FISHER'S EXACT TEST:  
Is the mean survival for the critical dilution (100%) at 7 days significantly different ( $p=0.05$ ) than the control survival?  
 Yes       No
  
2. DUNNETT'S PROCEDURE OR STEEL'S MANY-ONE RANK TEST AS APPROPRIATE:  
Is the mean number of young produced per female by the critical dilution (100%) significantly different ( $p=0.05$ ) than the control's number of young per female?  
 Yes       No
  
3. If the NOEC for survival is less than the critical dilution, enter [1], otherwise enter [0] for parameter #TLP3B:   0
  
4. If the NOEC for reproduction is less than the critical dilution, enter [1], otherwise enter [0] for parameter #TGP3B:   0
  
5. Report the NOEC value for survival, Parameter #TOP3B:  
NOEC survival 100% effluent
  
6. Report the NOEC value for reproduction, Parameter #TTP3B:  
NOEC reproduction 100% effluent
  
7. Report the % coefficient of variation (largest of critical and control dilutions), Parameter #TQP3B:  
CV % reproduction 28.0 % (control)

### **Whole Effluent Lethality Values for *Ceriodaphnia dubia***

1. Report the Whole Effluent Lethality values for the 30-Day average minimum, Parameter #22414:  
Daily Average Minimum NOEC: 100%
  
2. Report the Whole Effluent Lethality values for the 7-day minimum, Parameter #22414:  
7-Day Minimum NOEC: 100%

**WET Testing Summary Form**  
***Ceriodaphnia dubia* (Cladoceran)**  
**Chemical Parameters Chart**

Permittee: Walnut Ridge Wastewater Plant  
 NPDES No.: AR0046566  
 Contact: Jon Kopp  
 Analyst: Alves-Augusto/Martin

Sample No. 1 Collected Ending Date: 07/30/18 Time: 0900  
 Sample No. 2 Collected Ending Date: 08/01/18 Time: 0900  
 Sample No. 3 Collected Ending Date: 08/03/18 Time: 0900  
 Test Begin: Date: 07/30/18 Time: 1420 Test End: Date: 08/06/18 Time: 1420

Initial Water Chemistry for Chronic Tests								
Project: Walnut Ridge – <i>C. dubia</i>								
Test day		0	1	2	3	4	5	6
Date		7/30/2018	7/31/2018	8/1/2018	8/2/2018	8/3/2018	8/4/2018	8/5/2018
H <sub>2</sub> O #		MH 1022	MH 1022	MH 1022	MH 1022	MH 1022	MH 1022	MH 1023
Temp (°C)	Control	22.5	23.0	24.0	22.5	23.0	21.2	22.0
	32%	22.5	23.0	24.0	22.1	23.0	21.2	22.0
	42%	22.5	23.0	24.0	22.2	23.0	21.5	22.2
	56%	22.5	23.0	24.5	22.7	23.0	21.8	22.2
	80%	22.5	23.0	24.5	22.9	23.0	21.8	22.4
	100%	22.5	23.0	24.2	23.0	23.0	21.8	22.4
pH (Standard Units)	Control	7.92	7.89	7.93	7.88	7.85	7.82	7.88
	32%	8.19	7.96	8.03	8.05	8.00	8.03	8.05
	42%	8.22	7.99	8.05	8.07	8.01	8.05	8.07
	56%	8.26	7.99	8.05	8.09	8.01	8.08	8.07
	80%	8.29	7.98	8.05	8.08	8.01	8.06	8.10
	100%	8.30	7.97	8.02	8.06	8.00	8.03	8.09
DO (mg/L)	Control	8.8	9.1	9.0	9.0	8.7	8.7	8.9
	32%	9.0	9.0	9.0	9.0	8.8	8.8	9.0
	42%	8.8	9.0	8.8	8.9	8.7	8.7	8.9
	56%	8.7	9.0	8.7	8.9	8.7	8.6	8.9
	80%	8.6	9.0	8.6	8.8	8.7	8.6	8.9
	100%	8.3	9.0	8.6	8.8	8.6	8.5	8.7
Cond (µS/cm)	Control	275	274	276	278	277	275	291
	32%	329	322	328	327	328	332	340
	42%	346	338	347	344	347	354	358
	56%	371	360	371	367	371	383	381
	80%	419	401	414	408	415	425	424
	100%	462	433	448	441	450	455	459
Alk (mg/L)	Control	56		56		56		59
	100%	172		160		172		
Hard (mg/L)	Control	85		85		85		90
	100%	190		190		190		



**WET Testing Summary Form**  
***Ceriodaphnia dubia* (Cladoceran)**

**Chemical Parameters Chart**

Permittee: Walnut Ridge Wastewater Plant      Sample No. 1 Collected    Ending Date: 07/30/18    Time: 0900  
 NPDES No.: AR0046566                              Sample No. 2 Collected    Ending Date: 08/01/18    Time: 0900  
 Contact: Jon Kopp                                      Sample No. 3 Collected    Ending Date: 08/03/18    Time: 0900  
 Analyst: Alves-Augusto/Martin                  Test Begin: Date: 07/30/18 Time: 1420 Test End: Date: 08/06/18    Time: 1420

Final Water Chemistry for Chronic Tests								
Project: Walnut Ridge - <i>C.dubia</i>								
Test day		1	2	3	4	5	6	7
Date:		7/31/2018	8/1/2018	8/2/2018	8/3/2018	8/4/2018	8/5/2018	8/6/2018
H <sub>2</sub> O #		MH 1022	MH 1022	MH 1022	MH 1022	MH 1022	MH 1023	MH 1023
Temp (°C)	Control	22.0	24.0	22.1	22.5	21.0	21.2	23.6
	32%	22.2	23.5	22.7	22.3	21.0	21.2	23.6
	42%	22.2	23.5	22.3	22.1	21.2	21.4	23.4
	56%	22.2	23.5	22.5	22.5	21.2	21.4	23.5
	80%	22.3	23.8	22.9	22.6	21.5	21.8	23.4
	100%	22.5	24.0	23.0	22.9	21.5	21.8	23.5
pH (Standard Units)	Control	8.07	8.17	8.16	7.97	7.87	7.99	8.09
	32%	8.20	8.52	8.32	8.29	8.11	8.25	8.39
	42%	8.28	8.50	8.37	8.28	8.19	8.27	8.42
	56%	8.31	8.57	8.39	8.41	8.25	8.33	8.50
	80%	8.40	8.57	8.46	8.39	8.32	8.39	8.48
	100%	8.44	8.62	8.50	8.49	8.38	8.47	8.57
DO (mg/L)	Control	8.8	8.8	8.9	8.9	8.9	9.1	8.9
	32%	8.7	8.9	8.9	8.7	8.9	9.1	8.6
	42%	8.8	9.1	9.0	8.7	8.9	9.1	8.6
	56%	8.8	9.1	9.0	8.6	9.0	9.1	8.6
	80%	8.8	9.1	9.0	8.7	9.0	9.0	8.6
	100%	8.8	9.1	9.0	8.6	8.7	9.0	8.5

**SUMMARY REPORTING FORM**  
**WET Testing**  
**Fathead Minnow Larvae (*Pimephales promelas*) Survival and Growth**

Permittee: Walnut Ridge WWT Plant

NPDES No.: AR0046566

		<u>Time</u>	<u>Date</u>	to	<u>Time</u>	<u>Date</u>
Composite 1:	Collected from	0900	07/29/18		0900	07/30/18
Composite 2:	Collected from	0900	07/31/18		0900	08/01/18
Composite 3:	Collected from	0900	08/02/18		0900	08/03/18
Test Initiated:	1435					Date: 07/30/18
Time Terminated:	1430					Date: 08/06/18
Dilution H <sub>2</sub> O:	MH 1022/1023					

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**DATA TABLE FOR SURVIVAL**

Effluent Conc. %	% Survival in Replicate Chambers					Mean % Survival			CV%
	A	B	C	D	E	24h	48h	7days	
	<b>Control</b>	100	100	100	100	100	100	100	
<b>32</b>	87.5	100	100	87.5	100	100	100	95	<b>7.2</b>
<b>42</b>	100	100	100	100	100	100	100	100	<b>0.0</b>
<b>56</b>	100	87.5	100	100	100	100	100	97.5	<b>5.7</b>
<b>80</b>	100	100	100	100	100	100	100	100	<b>0.0</b>
<b>100</b>	100	100	100	100	100	100	100	100	<b>0.0</b>

**DATA TABLE FOR GROWTH**

Effluent Conc %	Average Dry Weight in Replicate Chambers (mg)					Mean Dry Weight (mg)	CV%
	A	B	C	D	E		
<b>Control</b>	0.3312	0.3287	0.3487	0.3725	0.3550	0.3472	5.2
<b>32</b>	0.3143	0.3000	0.3512	0.2957	0.4225	0.3367	15.7
<b>42</b>	0.3350	0.2662	0.2925	0.3287	0.3163	0.3077	9.2
<b>56</b>	0.2963	0.3529	0.3687	0.2800	0.3225	0.3241	11.5
<b>80</b>	0.3237	0.3337	0.3500	0.3987	0.3087	0.3430	10.1
<b>100</b>	0.3263	0.4125	0.3725	0.3775	0.4012	0.3780	8.8

## Fathead Minnow Larvae (*Pimephales promelas*) Survival and Growth

### 1. FISHER'S EXACT TEST:

Is the mean survival for the critical dilution (100%) at 7 days significantly different (p=0.05) than the control survival?

Yes  No

### 2. DUNNETT'S PROCEDURE OR STEEL'S MANY-ONE RANK TEST AS APPROPRIATE:

Is the mean growth by *P. promelas* in the critical dilution (100%) significantly different (p=0.05) than the growth in control exposures?

Yes  No

3. If the NOEC for survival is less than the critical dilution, enter [1], otherwise enter [0] for parameter #TLP6C:   0  

4. If the NOEC for growth is less than the critical dilution, enter [1], otherwise enter [0] for parameter #TGP6C:   0  

5. Report the NOEC value for survival, Parameter #TOP6C:  
NOEC survival  100  % effluent

6. Report the NOEC value for growth, Parameter #TPP6C:  
NOEC growth  100  % effluent

7. Report the % coefficient of variation (largest of low flow and control dilutions), Parameter #TQP6C: CV % growth  8.8%  (critical)

## Whole Effluent Lethality Values

1. Report the Whole Effluent Lethality values for the 30-Day average minimum, Parameter #22414:

Daily Average Minimum NOEC:  100% 

2. Report the Whole Effluent Lethality values for the 7-day minimum, Parameter #22414:

7-Day Minimum NOEC:  100%

**WET Testing Summary Form**  
**Fathead Minnow Larvae (*Pimephales promelas*)**

**Chemical Parameters Chart**

Permittee: Walnut Ridge Wastewater Plant      Sample No. 1 Collected    Ending Date: 07/30/18    Time: 0900  
 NPDES No.: AR0046566                              Sample No. 2 Collected    Ending Date: 08/01/18    Time: 0900  
 Contact: Jon Kopp                                      Sample No. 3 Collected    Ending Date: 08/03/18    Time: 0900  
 Analyst: Atwell/Alves-Augusto                  Test Begin: Date: 07/30/18 Time: 1435 Test End: Date: 08/06/18    Time: 1430

Initial Water Chemistry for Chronic Tests								
Project: Walnut Ridge – <i>P. promelas</i>								
Test day		0	1	2	3	4	5	6
Date		7/30/2018	7/31/2018	8/1/2018	8/2/2018	8/3/2018	8/4/2018	8/5/2018
H <sub>2</sub> O #		MH 1022	MH 1022	MH 1022	MH 1022	MH 1022	MH 1022	MH 1023
Temp (°C)	Control	22.5	23.0	24.0	22.5	23.0	21.2	22.0
	32%	22.5	23.0	24.0	22.1	23.0	21.2	22.0
	42%	22.5	23.0	24.0	22.2	23.0	21.5	22.2
	56%	22.5	23.0	24.5	22.7	23.0	21.8	22.2
	80%	22.5	23.0	24.5	22.9	23.0	21.8	22.4
	100%	22.5	23.0	24.2	23.0	23.0	21.8	22.4
pH (Standard Units)	Control	7.92	7.89	7.93	7.88	7.85	7.82	7.88
	32%	8.19	7.96	8.03	8.05	8.00	8.03	8.05
	42%	8.22	7.99	8.05	8.07	8.01	8.05	8.07
	56%	8.26	7.99	8.05	8.09	8.01	8.08	8.07
	80%	8.29	7.98	8.05	8.08	8.01	8.06	8.10
	100%	8.30	7.97	8.02	8.06	8.00	8.03	8.09
DO (mg/L)	Control	8.8	9.1	9.0	9.0	8.7	8.7	8.9
	32%	9.0	9.0	9.0	9.0	8.8	8.8	9.0
	42%	8.8	9.0	8.8	8.9	8.7	8.7	8.9
	56%	8.7	9.0	8.7	8.9	8.7	8.6	8.9
	80%	8.6	9.0	8.6	8.8	8.7	8.6	8.9
	100%	8.3	9.0	8.6	8.8	8.6	8.5	8.7
Cond (µS/cm)	Control	275	274	276	278	277	275	291
	32%	329	322	328	327	328	332	340
	42%	346	338	347	344	347	354	358
	56%	371	360	371	367	371	383	381
	80%	419	401	414	408	415	425	424
	100%	462	433	448	441	450	455	459
Alk (mg/L)	Control	56		56		56		59
	100%	172		160		172		
Hard (mg/L)	Control	85		85		85		90
	100%	190		190		190		

**WET Testing Summary Form**  
**Fathead Minnow Larvae (*Pimephales promelas*)**

**Chemical Parameters Chart**

Permittee: Walnut Ridge Wastewater Plant      Sample No. 1 Collected    Ending Date: 07/30/18    Time: 0900  
 NPDES No.: AR0046566                              Sample No. 2 Collected    Ending Date: 08/01/18    Time: 0900  
 Contact: Jon Kopp                                      Sample No. 3 Collected    Ending Date: 08/03/18    Time: 0900  
 Analyst: Atwell/Alves-Augusto                  Test Begin: Date: 07/30/18 Time: 1435 Test End: Date: 08/06/18    Time: 1430

<b>Final Water Chemistry for Chronic Tests</b>								
Project: Walnut Ridge - <i>P. Promelas</i>								
Test day		1	2	3	4	5	6	7
Date:		7/31/2018	8/1/2018	8/2/2018	8/3/2018	8/4/2018	8/5/2018	8/6/2018
H <sub>2</sub> O #		MH 1022	MH 1022	MH 1022	MH 1022	MH 1022	MH 1023	MH 1023
Temp (°C)	Control	22.5	23.0	22.5	23.5	22.0	22.1	24.6
	32%	22.6	23.1	22.7	23.3	22.0	22.1	24.6
	42%	22.5	23.0	22.7	23.0	22.0	22.3	24.4
	56%	22.8	23.4	22.7	23.0	22.0	23.4	24.3
	80%	22.9	23.5	23.0	23.6	22.1	22.4	24.2
	100%	23.1	23.7	23.2	23.0	22.2	22.6	24.6
pH (Standard Units)	Control	7.73	7.53	7.68	7.55	7.54	7.43	7.48
	32%	8.00	7.85	7.92	7.85	7.83	7.77	7.95
	42%	8.06	7.93	8.00	7.90	7.86	7.83	7.98
	56%	8.15	8.04	8.06	8.02	7.94	7.92	8.03
	80%	8.20	8.13	8.14	8.11	8.05	8.02	8.15
	100%	8.26	8.19	8.21	8.20	8.15	8.14	8.29
DO (mg/L)	Control	8.5	7.9	8.2	7.7	7.7	7.2	7.8
	32%	8.2	7.6	8.0	7.7	7.7	7.2	7.5
	42%	8.1	7.6	7.9	7.6	7.7	7.3	7.7
	56%	8.1	7.7	7.9	7.5	7.4	7.3	7.5
	80%	8.1	7.7	8.1	7.6	7.5	7.4	8.0
	100%	7.9	7.7	8.1	7.7	7.4	7.1	8.0

**CETIS Analytical Report**

Report Date: 14 Aug-18 08:05 (p 1 of 1)  
 Test Code: 33B5AA9 | 00-5422-1481

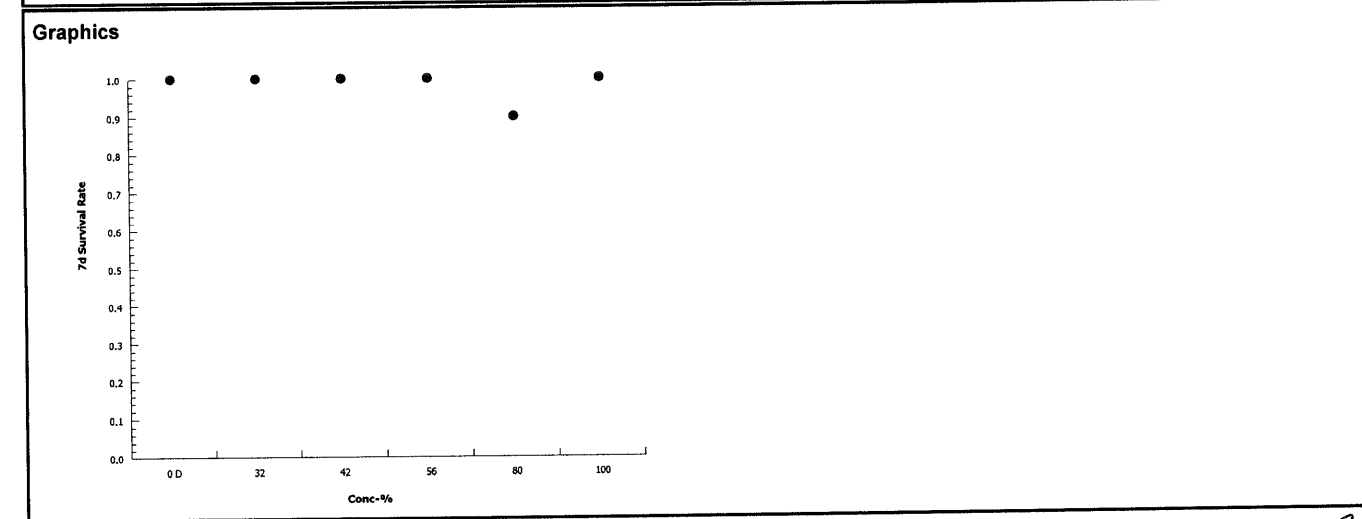
Ceriodaphnia 7-d Survival and Reproduction Test			A-State Ecotoxicology Research Facility		
Analysis ID: 01-5628-2263	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.9.2	Analized: 14 Aug-18 8:04	Analysis: STP 2xK Contingency Tables	Official Results: Yes
Batch ID: 12-1556-5836	Test Type: Reproduction-Survival (7d)	Analyst:	Start Date: 30 Jul-18 14:20	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water
Ending Date: 06 Aug-18 14:20	Species: Ceriodaphnia dubia	Brine:	Duration: 7d 0h	Source: In-House Culture	Age: <24h
Sample ID: 03-1927-7397	Code: 1307C955	Client: Walnut Ridge	Sample Date: 30 Jul-18	Material: POTW Effluent	Project: WET Quarterly Compliance Test (3Q)
Receipt Date:	Source: NPDES Permit # (AR0046566) (AR004656)	Station:	Sample Age: 14h		

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU
Untransformed	C > T	100	> 100	n/a	1

Fisher Exact/Bonferroni-Holm Test						
Control	vs	Group	Test Stat	P-Type	P-Value	Decision(α:5%)
Dilution Water		32	1.0000	Exact	1.0000	Non-Significant Effect
		42	1.0000	Exact	1.0000	Non-Significant Effect
		56	1.0000	Exact	1.0000	Non-Significant Effect
		80	0.5000	Exact	1.0000	Non-Significant Effect
		100	1.0000	Exact	1.0000	Non-Significant Effect

Data Summary							
Conc-%	Code	NR	R	NR + R	Prop NR	Prop R	%Effect
0	D	10	0	10	1	0	0.0%
32		10	0	10	1	0	0.0%
42		10	0	10	1	0	0.0%
56		10	0	10	1	0	0.0%
80		9	1	10	0.9	0.1	10.0%
100		10	0	10	1	0	0.0%

7d Survival Rate Detail											
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	D	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
32		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
42		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
56		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
80		0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000



# CETIS Analytical Report

Report Date: 14 Aug-18 08:13 (p 2 of 2)  
Test Code: 33B5AA9 | 00-5422-1481

## Ceriodaphnia 7-d Survival and Reproduction Test

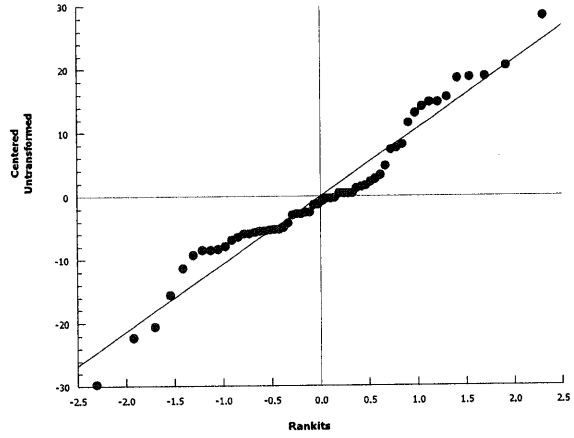
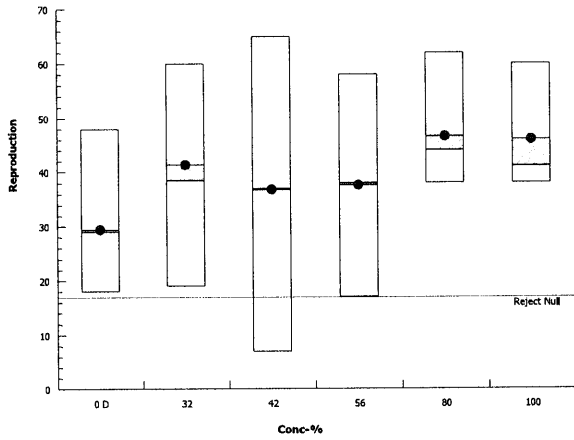
A-State Ecotoxicology Research Facility

Analysis ID: 14-8961-7615  
Analyzed: 14 Aug-18 8:11

Endpoint: Reproduction  
Analysis: Parametric-Multiple Comparison

CETIS Version: CETISv1.9.2  
Official Results: Yes

### Graphics



# CETIS Analytical Report

Report Date: 14 Aug-18 08:13 (p 1 of 2)  
 Test Code: 33B5AA9 | 00-5422-1481

Ceriodaphnia 7-d Survival and Reproduction Test			A-State Ecotoxicology Research Facility		
<b>Analysis ID:</b> 14-8961-7615	<b>Endpoint:</b> Reproduction	<b>CETIS Version:</b> CETISv1.9.2			
<b>Analyzed:</b> 14 Aug-18 8:11	<b>Analysis:</b> Parametric-Multiple Comparison	<b>Official Results:</b> Yes			
<b>Batch ID:</b> 12-1556-5836	<b>Test Type:</b> Reproduction-Survival (7d)	<b>Analyst:</b>			
<b>Start Date:</b> 30 Jul-18 14:20	<b>Protocol:</b> EPA/821/R-02-013 (2002)	<b>Diluent:</b> Mod-Hard Synthetic Water			
<b>Ending Date:</b> 06 Aug-18 14:20	<b>Species:</b> Ceriodaphnia dubia	<b>Brine:</b>			
<b>Duration:</b> 7d 0h	<b>Source:</b> In-House Culture	<b>Age:</b> <24h			
<b>Sample ID:</b> 03-1927-7397	<b>Code:</b> 1307C955	<b>Client:</b> Walnut Ridge			
<b>Sample Date:</b> 30 Jul-18	<b>Material:</b> POTW Effluent	<b>Project:</b> WET Quarterly Compliance Test (3Q)			
<b>Receipt Date:</b>	<b>Source:</b> NPDES Permit # (AR0046566) (AR004656)				
<b>Sample Age:</b> 14h	<b>Station:</b>				

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	> 100	n/a	1	42.31%

Bonferroni Adj t Test									
Control	vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water		32	-2.359	2.4	12.11	18	CDF	1.0000	Non-Significant Effect
		42	-1.467	2.4	12.11	18	CDF	1.0000	Non-Significant Effect
		56	-1.626	2.4	12.11	18	CDF	1.0000	Non-Significant Effect
		80	-3.311	2.4	12.44	17	CDF	1.0000	Non-Significant Effect
		100	-3.203	2.4	12.44	17	CDF	1.0000	Non-Significant Effect

ANOVA Table						
Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	1988.93	397.787	5	3.127	0.0153	Significant Effect
Error	6614.72	127.206	52			
Total	8603.66		57			

Distributional Tests						
Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)	
Variances	Bartlett Equality of Variance Test	4.27	15.09	0.5112	Equal Variances	
Distribution	Shapiro-Wilk W Normality Test	0.9576	0.9443	0.0413	Normal Distribution	

Reproduction Summary											
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	10	29.4	23.52	35.28	29	18	48	2.6	27.97%	0.00%
32		10	41.3	32.24	50.36	38.5	19	60	4.003	30.65%	-40.48%
42		10	36.8	26.68	46.92	37	7	65	4.474	38.45%	-25.17%
56		10	37.6	28.5	46.7	38	17	58	4.023	33.83%	-27.89%
80		9	46.56	39.58	53.53	44	38	62	3.024	19.48%	-58.35%
100		9	46	39.08	52.92	41	38	60	3	19.57%	-56.46%

Reproduction Detail											
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5	Rep 6	Rep 7	Rep 8	Rep 9	Rep 10
0	D	48	29	24	28	18	21	29	31	32	34
32		36	37	41	56	19	32	60	56	36	40
42		7	65	44	39	31	34	36	38	34	40
56		38	32	22	56	38	58	38	39	17	38
80		62	41	38	58	44	44	40	54	38	
100		40	59	60	40	38	39	43	54	41	



**CHRONIC TEST DATA SHEET**  
*Ceriodaphnia dubia*

Project: Walnut Ridge Beginning Date: 073018 Time: 1420 Test Species: C. dubia  
Dilution H<sub>2</sub>O: MH/022 Ending Date: 080618 Time: 1420 Age: 24

Test Type: ( \* )Static Renewal ( ) Flowthrough Toxicant/Effluent: \_\_\_\_\_

Conc.	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Neonates
Control	1	0	0	0	8	9	14	17	<del>58</del> 28
	2	↓	↓	↓	5	10	0	14	29
	3	↓	↓	↓	5	0	7	12	24
	4	↓	↓	↓	7	8	0	13	28
	5	↓	↓	↓	0	0	10	8	18
	6	↓	↓	↓	4	8	0	9	21
	7	↓	↓	↓	7	8	14	0	29
	8	↓	↓	↓	7	9	0	15	29 31
	9	↓	↓	↓	8	10	0	14	32
	10	↓	↓	↓	7	12	0	15	34
32%	1	0	0	0	8	12	16	0	36
	2	↓	↓	↓	5	14	0	18	37
	3	↓	↓	↓	8	13	20	0	41
	4	↓	↓	↓	7	13	19	17	56
	5	↓	↓	↓	6	6	0	7	19
	6	↓	↓	↓	8	9	0	15	32
	7	↓	↓	↓	7	8	21	24	60
	8	↓	↓	↓	3	13	20	20	56
	9	↓	↓	↓	7	11	18	0	36
	10	↓	↓	↓	8	13	0	19	40
Date	073018	073118	080118	080218	080318	080418	080518	080618	080618
Initials	EM	EM	EM	AM	EM	A <sup>3</sup>	A <sup>3</sup>	EM	EM

**CHRONIC TEST DATA SHEET**  
*Ceriodaphnia dubia*

Project: Walnut Ridge Beginning Date: 073018 Time: 1420 Test Species: C. dubia  
Dilution H<sub>2</sub>O: M#1022 Ending Date: 080618 Time: 1420 Age: <24

Test Type: ( \* )Static Renewal ( ) Flowthrough Toxicant/Effluent:

Conc.	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Neonates
42%	1	0	0	0	7	0	0	0	7
	2	↓	↓	↓	8	14	22	21	65
	3	↓	↓	↓	8	10	8	18	44
	4	↓	↓	↓	7	12	0	20	39
	5	↓	↓	↓	6	11	14	0	31
	6	↓	↓	↓	1	15	18	0	34
	7	↓	↓	↓	5	15	16	0	36
	8	↓	↓	↓	7	14	0	17	38
	9	↓	↓	↓	7	12	0	15	34
	10	↓	↓	↓	5	14	0	21	40
56%	1	0	0	0	6	10	0	22	38
	2	↓	↓	↓	4	11	0	17	32
	3	↓	↓	↓	0	9	0	13	22
	4	↓	↓	↓	7	12	21	16	56
	5	↓	↓	↓	9	12	0	17	38
	6	↓	↓	↓	8	14	22	14	<sup>em</sup> 48 58
	7	↓	↓	↓	8	15	15	0	38
	8	↓	↓	↓	7	13	0	14	39
	9	↓	↓	↓	1	0	6	10	17
	10	↓	↓	↓	7	14	0	17	38
Date	073018	073118	080118	080218	080318	080418	080518	080618	080618
Initials	EM	EM	EM	awc	EM	A'	A'	EM	EM

**CHRONIC TEST DATA SHEET**  
*Ceriodaphnia dubia*

Project: Walnut Ridge Beginning Date: 073018 Time: 1420 Test Species: C.dubia  
Dilution H<sub>2</sub>O: MH1022 Ending Date: 080618 Time: 1420 Age: <24

Test Type: ( \* )Static Renewal ( ) Flowthrough Toxicant/Effluent: \_\_\_\_\_

Conc.	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Neonates
80%	1	0	0	0	6	0	* / 2	X	X / 8
	2				8	14	16	24	62
	3				8	13	0	20	41
	4				7	9	0	22	38
	5				8	11	21	18	58
	6				8	15	21	0	44
	7				8	13	0	23	44
	8				7	13	20	0	40
	9				7	8	19	20	54
	10		↓	↓	↓	3	16	0	19
100%	1	0	0	0	7	14	0	19	40
	2				7	13	20	19	59
	3				9	12	20	19	60
	4				0	0	0	0	0
	5				7	11	0	22	40
	6				6	10	22	0	38
	7				8	11	1	19	39
	8				8	12	22	1	43
	9				5	7	20	22	54
	10		↓	↓	↓	9	13	19	0
Date	073018	073118	080118	080218	080318	080418	080518	080618	080618
Initials	EM	EM	EM	AMC	EM	AJ	AJ	EM	EM

**CETIS Analytical Report**

Report Date: 14 Aug-18 07:48 (p 1 of 4)  
 Test Code: 3165ED16 | 08-2876-3414

Fathead Minnow 7-d Larval Survival and Growth Test			A-State Ecotoxicology Research Facility		
Analysis ID: 18-3278-0562	Endpoint: 7d Survival Rate	CETIS Version: CETISv1.9.2			
Analyzed: 14 Aug-18 7:46	Analysis: Nonparametric-Control vs Treatments	Official Results: Yes			
Batch ID: 10-1169-3528	Test Type: Growth-Survival (7d)	Analyst:			
Start Date: 30 Jul-18 14:35	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water			
Ending Date: 06 Aug-18 14:30	Species: Pimephales promelas	Brine:			
Duration: 7d	Source: In-House Culture	Age: <24h			
Sample ID: 21-3467-3442	Code: 7F3C8822	Client: Walnut Ridge			
Sample Date: 30 Jul-18	Material: POTW Effluent	Project: WET Quarterly Compliance Test (3Q)			
Receipt Date:	Source: NPDES Permit # (AR0046566) (AR004656)				
Sample Age: 15h	Station:				

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Angular (Corrected)	C > T	100	> 100	n/a	1	6.46%

Steel Many-One Rank Sum Test									
Control	vs	Conc-%	Test Stat	Critical	Ties	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water		32	22.5	16	1	8	Asymp	0.3937	Non-Significant Effect
		42	27.5	16	1	8	Asymp	0.8333	Non-Significant Effect
		56	25	16	1	8	Asymp	0.6353	Non-Significant Effect
		80	27.5	16	1	8	Asymp	0.8333	Non-Significant Effect
		100	27.5	16	1	8	Asymp	0.8333	Non-Significant Effect

ANOVA Table						
Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0236108	0.0047222	5	1.68	0.1778	Non-Significant Effect
Error	0.0674594	0.0028108	24			
Total	0.0910702		29			

Distributional Tests						
Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)	
Variances	Bartlett Equality of Variance Test	445.4	15.09	2.2E-07	Unequal Variances	
Distribution	Shapiro-Wilk W Normality Test	0.712	0.9031	2.3E-06	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	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
32		5	0.9500	0.8650	1.0000	1.0000	0.8750	1.0000	0.0306	7.21%	5.00%
42		5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
56		5	0.9750	0.9056	1.0000	1.0000	0.8750	1.0000	0.0250	5.73%	2.50%
80		5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%
100		5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.00%	0.00%

Angular (Corrected) Transformed Summary											
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	1.393	1.393	1.393	1.393	1.393	1.393	0	0.00%	0.00%
32		5	1.32	1.195	1.445	1.393	1.209	1.393	0.04499	7.62%	5.27%
42		5	1.393	1.393	1.393	1.393	1.393	1.393	0	0.00%	0.00%
56		5	1.356	1.254	1.458	1.393	1.209	1.393	0.03673	6.06%	2.64%
80		5	1.393	1.393	1.393	1.393	1.393	1.393	0	0.00%	0.00%
100		5	1.393	1.393	1.393	1.393	1.393	1.393	0	0.00%	0.00%

**CETIS Analytical Report**

Report Date: 14 Aug-18 07:48 (p 2 of 4)  
 Test Code: 3165ED16 | 08-2876-3414

**Fathead Minnow 7-d Larval Survival and Growth Test** **A-State Ecotoxicology Research Facility**

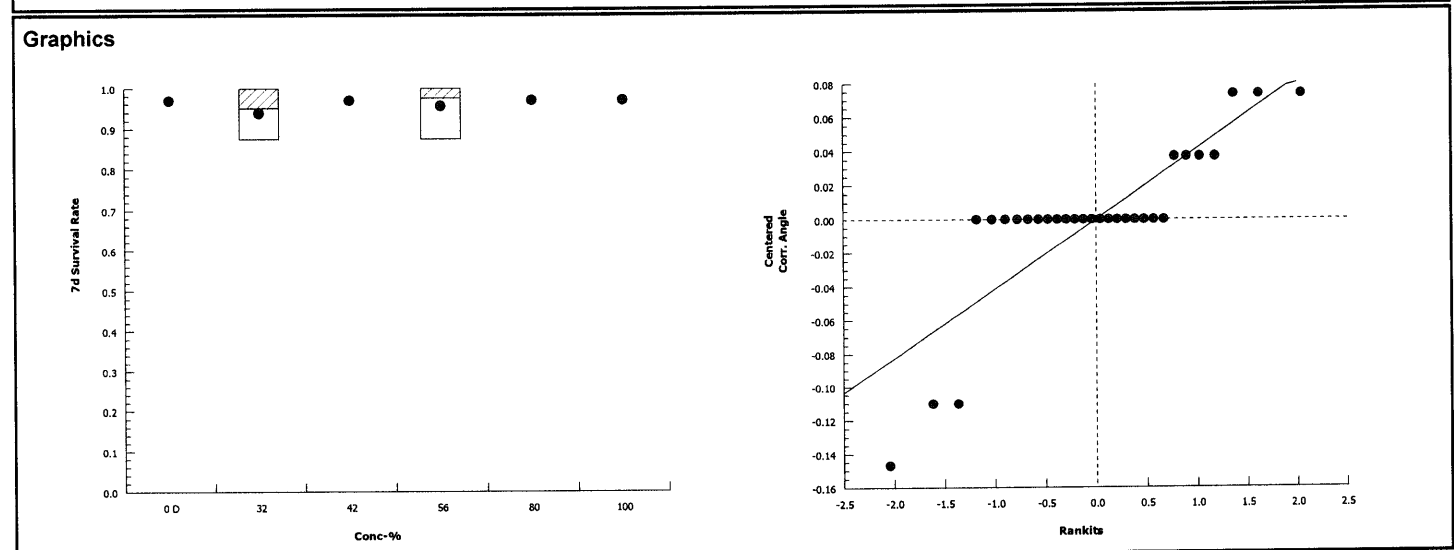
Analysis ID: 18-3278-0562      Endpoint: 7d Survival Rate      CETIS Version: CETISv1.9.2  
 Analyzed: 14 Aug-18 7:46      Analysis: Nonparametric-Control vs Treatments      Official Results: Yes

**7d Survival Rate Detail**

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.0000	1.0000	1.0000	1.0000	1.0000
32		0.8750	1.0000	1.0000	0.8750	1.0000
42		1.0000	1.0000	1.0000	1.0000	1.0000
56		1.0000	0.8750	1.0000	1.0000	1.0000
80		1.0000	1.0000	1.0000	1.0000	1.0000
100		1.0000	1.0000	1.0000	1.0000	1.0000

**Angular (Corrected) Transformed Detail**

Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	1.393	1.393	1.393	1.393	1.393
32		1.209	1.393	1.393	1.209	1.393
42		1.393	1.393	1.393	1.393	1.393
56		1.393	1.209	1.393	1.393	1.393
80		1.393	1.393	1.393	1.393	1.393
100		1.393	1.393	1.393	1.393	1.393



**CETIS Analytical Report**

Report Date: 14 Aug-18 07:48 (p 3 of 4)  
 Test Code: 3165ED16 | 08-2876-3414

<b>Fathead Minnow 7-d Larval Survival and Growth Test</b>			<b>A-State Ecotoxicology Research Facility</b>		
Analysis ID: 07-0597-0977	Endpoint: Mean Dry Weight-mg	CETIS Version: CETISv1.9.2			
Analyzed: 14 Aug-18 7:46	Analysis: Parametric-Control vs Treatments	Official Results: Yes			
Batch ID: 10-1169-3528	Test Type: Growth-Survival (7d)	Analyst:			
Start Date: 30 Jul-18 14:35	Protocol: EPA/821/R-02-013 (2002)	Diluent: Mod-Hard Synthetic Water			
Ending Date: 06 Aug-18 14:30	Species: Pimephales promelas	Brine:			
Duration: 7d	Source: In-House Culture	Age: <24h			
Sample ID: 21-3467-3442	Code: 7F3C8822	Client: Walnut Ridge			
Sample Date: 30 Jul-18	Material: POTW Effluent	Project: WET Quarterly Compliance Test (3Q)			
Receipt Date:	Source: NPDES Permit # (AR0046566) (AR004656)				
Sample Age: 15h	Station:				

Data Transform	Alt Hyp	NOEL	LOEL	TOEL	TU	PMSD
Untransformed	C > T	100	> 100	n/a	1	15.31%

Dunnett Multiple Comparison Test									
Control	vs	Conc-%	Test Stat	Critical	MSD	DF	P-Type	P-Value	Decision(α:5%)
Dilution Water		32	0.4661	2.362	0.053	8	CDF	0.6616	Non-Significant Effect
		42	1.755	2.362	0.053	8	CDF	0.1512	Non-Significant Effect
		56	1.03	2.362	0.053	8	CDF	0.4068	Non-Significant Effect
		80	0.1885	2.362	0.053	8	CDF	0.7717	Non-Significant Effect
		100	-1.367	2.362	0.053	8	CDF	0.9943	Non-Significant Effect

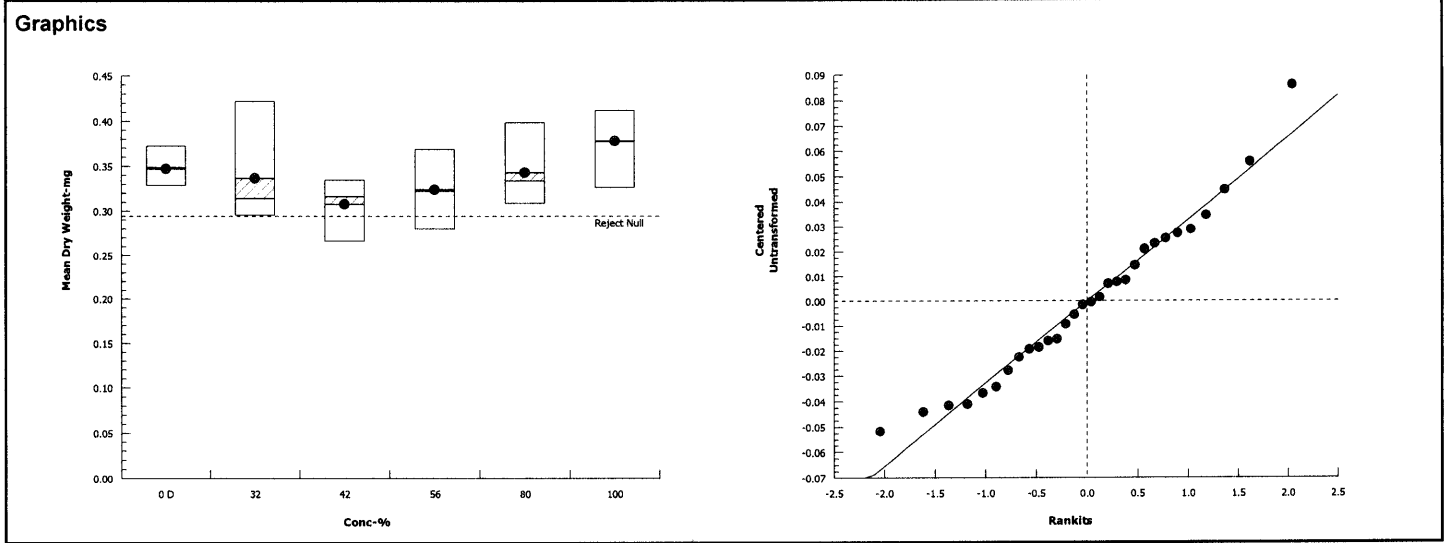
ANOVA Table						
Source	Sum Squares	Mean Square	DF	F Stat	P-Value	Decision(α:5%)
Between	0.0140406	0.0028081	5	2.218	0.0856	Non-Significant Effect
Error	0.0303815	0.0012659	24			
Total	0.0444221		29			

Distributional Tests						
Attribute	Test	Test Stat	Critical	P-Value	Decision(α:1%)	
Variances	Bartlett Equality of Variance Test	4.114	15.09	0.5331	Equal Variances	
Distribution	Shapiro-Wilk W Normality Test	0.9707	0.9031	0.5574	Normal Distribution	

Mean Dry Weight-mg Summary											
Conc-%	Code	Count	Mean	95% LCL	95% UCL	Median	Min	Max	Std Err	CV%	%Effect
0	D	5	0.3472	0.3249	0.3696	0.3487	0.3287	0.3725	0.008058	5.19%	0.00%
32		5	0.3367	0.2713	0.4022	0.3143	0.2957	0.4225	0.02356	15.65%	3.02%
42		5	0.3077	0.2726	0.3429	0.3163	0.2662	0.335	0.01267	9.21%	11.37%
56		5	0.3241	0.2778	0.3703	0.3225	0.28	0.3687	0.01665	11.49%	6.67%
80		5	0.343	0.3	0.3859	0.3337	0.3087	0.3987	0.01547	10.09%	1.22%
100		5	0.378	0.3366	0.4193	0.3775	0.3263	0.4125	0.01489	8.81%	-8.86%

Mean Dry Weight-mg Detail						
Conc-%	Code	Rep 1	Rep 2	Rep 3	Rep 4	Rep 5
0	D	0.3312	0.3287	0.3487	0.3725	0.355
32		0.3143	0.3	0.3512	0.2957	0.4225
42		0.335	0.2662	0.2925	0.3287	0.3163
56		0.2963	0.3529	0.3687	0.28	0.3225
80		0.3237	0.3337	0.35	0.3987	0.3087
100		0.3263	0.4125	0.3725	0.3775	0.4012

<b>Fathead Minnow 7-d Larval Survival and Growth Test</b>		<b>A-State Ecotoxicology Research Facility</b>	
<b>Analysis ID:</b> 07-0597-0977	<b>Endpoint:</b> Mean Dry Weight-mg	<b>CETIS Version:</b> CETISv1.9.2	
<b>Analyzed:</b> 14 Aug-18 7:46	<b>Analysis:</b> Parametric-Control vs Treatments	<b>Official Results:</b> Yes	



**CHRONIC TEST DATA SHEET**  
*Pimephales promelas*

Project: Walnut Ridge Beginning Date: 073018 Time: 1435 Test Species: *P. promelas*  
Dilution H<sub>2</sub>O: M41027 Ending Date: 080618 Time: 1430 Age: < 24hrs

Test Type: ( \* )Static Renewal ( ) Flowthrough Toxicant/ Effluent

Conc.	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Pan #
Control	1	8/0	8/0	8/0	8/0	8/0	8/0	8/0	1
	2	8/0	8/0	8/0	8/0	8/0	8/0	8/0	2
	3	8/0	8/0	8/0	8/0	8/0	8/0	8/0	3
	4	8/0	8/0	8/0	8/0	8/0	8/0	8/0	4
	5	8/0	8/0	8/0	8/0	8/0	8/0	8/0	5
32%	1	8/0	8/0	8/0	8/0	8/1	7/0	7/0	6
	2	8/0	8/0	8/0	8/0	8/0	8/0	8/0	7
	3	8/0	8/0	8/0	8/0	8/0	8/0	8/0	8
	4	8/0	8/0	8/0	8/0	8/0	8/0	8/1	9
	5	8/0	8/0	8/0	8/0	8/0	8/0	8/0	10
42%	1	8/0	8/0	8/0	8/0	8/0	8/0	8/0	11
	2	8/0	8/0	8/0	8/0	8/0	8/0	8/0	12
	3	8/0	8/0	8/0	8/0	8/0	8/0	8/0	13
	4	8/0	8/0	8/0	8/0	8/0	8/0	8/0	14
	5	8/0	8/0	8/0	8/0	8/0	8/0	8/0	15
56%	1	8/0	8/0	8/0	8/0	8/0	8/0	8/0	16
	2	8/0	8/0	8/1	7/0	7/0	7/0	7/0	17
	3	8/0	8/0	8/0	8/0	8/0	8/0	8/0	18
	4	8/0	8/0	8/0	8/0	8/0	8/0	8/0	19
	5	8/0	8/0	8/0	8/0	8/0	8/0	8/0	20
Date		073118	080118	080218	080318	080418	080518	080618	080618
Initials		A	A	A	A	A	A	A/A	A/A



**CHRONIC TEST DATA SHEET**  
*Pimephales promelas*

Project: Walnut Ridge Beginning Date: 073018 Time: 1435 Test Species: P.promelas  
Dilution H<sub>2</sub>O: 1H1027 Ending Date: 080218 Time: 1430 Age: < 24hrs

Test Type: ( \* )Static Renewal ( ) Flowthrough Toxicant/Effluent: \_\_\_\_\_

Conc.	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Pan #
80%	1	8/0	8/0	8/0	8/0	8/0	8/0	8/0	21
	2	8/0	8/0	8/0	8/0	8/0	8/0	8/0	22
	3	8/0	8/0	8/0	8/0	8/0	8/0	8/0	23
	4	8/0	8/0	8/0	8/0	8/0	8/0	8/0	24
	5	8/0	8/0	8/0	8/0	8/0	8/0	8/0	25
100%	1	8/0	8/0	8/0	8/0	8/0	8/0	8/0	26
	2	8/0	8/0	8/0	8/0	8/0	8/0	8/0	27
	3	8/0	8/0	8/0	8/0	8/0	8/0	8/0	28
	4	8/0	8/0	8/0	8/0	8/0	8/0	8/0	29
	5	8/0	8/0	8/0	8/0	8/0	8/0	8/0	30
Date		073118	080118	080218	080318	080418	080518	080618	080618
Initials		A	A	A	A	A	A	A/A	A/A

**Initial Water Chemistry for Chronic Tests**  
Project: Walnut Ridge - *C. dubia* / *P. promelas*

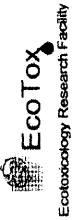
Test Day:		0	1	2	3	4	5	6
Date:		073018	073118	080118	080218	080318	080418	080518
H <sub>2</sub> O Batch #:		MH1022	MH1022	MH1022	MH1022	MH1022	MH1022	MH1023
Temp. (°C)	Control	22.5	23.0	24.0	22.5	23.0	21.2	22.0
	32%	22.5	23.0	24.0	22.1	23.0	21.2	22.0
	42%	22.5	23.0	24.0	22.2	23.0	21.5	22.2
	56%	22.5	23.0	24.5	22.7	23.0	21.8	22.2
	80%	22.5	23.0	24.5	22.9	23.0	21.8	22.4
	100%	22.5	23.0	24.2	23.0	23.0	21.8	22.4
pH	Control	7.92	7.89	7.93	7.88	7.85	7.82	7.88
	32%	8.19	7.96	8.03	8.05	8.00	8.03	8.05
	42%	8.22	7.99	8.05	8.07	8.01	8.05	8.07
	56%	8.26	7.99	8.05	8.09	8.01	8.08	8.07
	80%	8.29	7.98	8.05	8.08	8.01	8.06	8.10
	100%	8.30	7.97	8.08	8.06	8.00	8.03	8.09
DO (mg/L)	Control	8.8	9.1	9.0	9.0	8.7	8.7	8.9
	32%	9.0	9.0	9.0	9.0	8.8	8.8	9.0
	42%	8.8	9.0	8.8	8.9	8.7	8.7	8.9
	56%	8.7	9.0	8.7	8.9	8.7	8.6	8.9
	80%	8.6	9.0	8.6	8.8	8.7	8.6	8.9
	100%	8.3	9.0	8.6	8.8	8.6	8.5	8.7
Cond. (µS/cm)	Control	275	274	276	278	277	275	291
	32%	329	322	328	327	328	332	340
	42%	346	338	347	344	347	354	358
	56%	371	360	371	367	371	383	381
	80%	419	401	414	408	415	425	424
	100%	462	433	448	441	450	455	459
Alk. (mg/L)	Control	56		56		56		59
	100%	172		160	1	172		
Hard. (mg/L)	Control	85		85		85		90
	100%	190		190		190		
Initials		EM	*	EM	En	A'	A	A

**Final Water Chemistry for Chronic Tests**  
Project: Walnut Ridge - *C. dubia*

Test Day:		1	2	3	4	5	6	7
Date:		073118	080118	080218	080318	080418	080518	080618
H <sub>2</sub> O Batch #:		MH1022	MH1022	MH1022	MH1023	MH1022	MH1023	MH1023
Temp. (°C)	Control	22.0	24.0	22.1	22.5	21.0	21.2	23.6
	32%	22.2	23.5	22.7	22.3	21.0	21.2	23.6
	42%	22.2	23.5	22.3	22.1	21.2	21.4	23.4
	56%	22.2	23.5	22.5	22.5	21.2	21.4	23.5
	80%	22.3	23.8	22.7	22.6	21.5	21.8	23.4
	100%	22.5	24.0	23.0	22.9	21.5	21.8	23.5
pH	Control	8.07	8.17	8.16	7.97	7.37	7.99	8.09
	32%	8.20	8.52	8.32	8.29	8.11	8.25	8.39
	42%	8.28	8.50	8.37	8.28	8.19	8.27	8.42
	56%	8.31	8.57	8.39	8.41	8.25	8.33	8.50
	80%	8.40	8.57	8.46	8.39	8.32	8.39	8.48
	100%	8.44	8.62	8.50	8.49	8.38	8.47	8.57
DO (mg/L)	Control	8.8	8.8	8.9	8.9	8.9	9.1	8.9
	32%	8.7	8.9	8.9	8.7	8.9	9.1	8.6
	42%	8.8	9.1	9.0	8.7	8.9	9.1	8.6
	56%	8.8	9.1	9.0	8.6	9.0	9.1	8.6
	80%	8.8	9.1	9.0	8.7	9.0	9.0	8.6
	100%	8.8	9.1	9.0	8.6	8.7	9.0	8.5
Initials		EM	EM	LAB	EM	A3	A3	EM

**Final Water Chemistry for Chronic Tests**  
Project: Walnut Ridge - *P. promelas*

Test Day:		1	2	3	4	5	6	7
Date:		073118	080118	080218	080318	080418	080518	080618
H <sub>2</sub> O Batch #:		MH1022	MH1122	MH1022	MH1022	MH1022	MH1122	MH1023
Temp. (°C)	Control	22.5	23.0	22.5	23.5	22.0	22.1	24.6
	32%	22.6	23.1	22.7	23.3	22.0	22.1	24.6
	42%	22.5	23.0	22.7	23.0	22.0	22.3	24.4
	56%	22.8	23.4	22.7	23.0	22.0	22.4	24.3
	80%	22.9	23.5	23.0	23.5	22.1	22.4	24.2
	100%	23.1	23.7	23.2	23.0	22.2	22.6	24.6
pH	Control	7.73	7.53	7.68	7.55	7.54	7.43	7.48
	32%	8.00	7.85	7.92	7.85	7.83	7.77	7.95
	42%	8.06	7.93	8.00	7.90	7.86	7.83	7.98
	56%	8.15	8.04	8.06	8.02	7.94	7.92	8.03
	80%	8.20	8.13	8.14	8.11	8.05	8.02	8.15
	100%	8.26	8.19	8.21	8.20	8.15	8.14	8.29
DO (mg/L)	Control	8.5	7.9 <sup>7.9</sup>	8.2	7.7	7.7	7.2	7.8
	32%	8.2	7.6	8.0	7.7	7.7	7.2	7.5
	42%	8.1	7.6	7.9	7.6	7.7	7.3	7.7
	56%	8.1	7.7	7.9	7.5	7.4	7.3	7.5
	80%	8.1	7.7	8.1	7.6	7.5	7.4	8.0
	100%	7.9	7.7	8.1	7.7	7.4	7.1	8.0
Initials		J	J	LAB/A <sup>3</sup>	J	J	J	LAB



**Ecotoxicology Research Facility**  
 Arkansas State University  
 2645 Caddo Drive  
 State University, AR 72467  
 (870) 972-2570 Fax (870) 972-2577

# CHAIN OF CUSTODY RECORD



Client Name <b>Walnut Ridge Wastewater Treatment</b>		Phone: (870) 886-2312										
Project #		Fax:										
Sampler (sign) <i>[Signature]</i>		PO #:										
Remarks: Contact: <b>Jonathan Kopp</b>		Analyses (List Below)										
Cont. #	Sample ID Number	Sample Date	Sample Time	Sample Type			Matrix			Date	Time	
				Comp	Grab	Aqueous	Soil	Other	Chronic C. dubia			Chronic P. promelas
1	OFF 001	7-29-18	9 AM	X								
		7-30-18	9 AM									
Ice present at delivery: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Temp: 4.0 °C		Initials								
1. Relinquished By (sign) <i>[Signature]</i>		Date	Time	1. Received By (sign) <i>[Signature]</i>		Date	Time					
2. Relinquished By (sign)		Date	Time	2. Received By (sign)		Date	Time					



Ecotoxicology Research Facility

Arkansas State University

2645 Caddo Drive

State University, AR 72467

(870) 972-2570 Fax (870) 972-2577

# CHAIN OF CUSTODY RECORD



Client Name <b>Walnut Ridge Wastewater Treatment</b>		Phone: <b>(870) 886-2312</b>		Analyses (List Below)	
Project #		Fax:		Chronic <i>C. dubia</i>	
Sampler (sign) 		PO #:		Chronic <i>P. promelas</i>	
Remarks: Contact: <b>Jonathan Kopp</b>		Sample Date		Date	
Cont. #		Sample Time		Date	
Sample ID Number		Sample Date		Date	
Location		7-31 8-1 Jan - Jan		8-1-18	
Sample Type		Sample Time		Time	
Comp		Grab		Time	
Aqueous		Soil		Time	
Other		Other		Time	
Matrix		Other		Time	
Soil		Other		Time	
Aqueous		Other		Time	
Other		Other		Time	
Ice present at delivery:		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		Date	
Temp:		19 °C		8-1-18	
Initials				Time	
1. Relinquished By (sign)				1. Received By (sign)	
2. Relinquished By (sign)				2. Received By (sign)	

# CHAIN OF CUSTODY RECORD

Client Name <b>Walnut Ridge Wastewater Treatment</b>		Phone: <b>(870) 886-2312</b>												
Project #		Fax:												
Sample # (Sign) 		PO #:												
Remarks: Contact: <b>Jonathan Kopp</b>														
Cont #	Sample ID Number	Location	Sample Date	Sample Time	Sample Type			Matrix			Analyses (List Below)			
			8-2-8-3	9am to 9:45m	Comp	Grab	Aqueous	Soil	Other	Chronic C. dubia	Chronic P. promelas			
Ice present at delivery:		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No												
Temp:		1.1 °C			Initials									
1. Relinquished By (sign)					Date	8-3-18	Time	11:32	1. Received By (sign)		Date	080318	Time	1132
2. Relinquished By (sign)					Date		Time		2. Received By (sign)		Date		Time	



Ecotoxicology Research Facility

**SAMPLE CHECK IN**Sample ID Number: #1

Fill out this information with each effluent or river water sample coming in for testing. Keep completed sheets with test data and file with the lab QA/QC officer.

Date: 073018 Sampling Date: 0729-073018 Arrival Time: 1045Field Identification Number: \_\_\_\_\_ Description: CompsideShipped by: Federal Express \_\_\_\_\_ UPS \_\_\_\_\_ Hand delivered by: WR employeeDrop-Off Location: ASU-ERFStorage While Shipped: cooler with iceAnalysis Requested: chronic C dubia + P promelas

Initial Water Chemistry Analysis:

Sample Received by: VARBTemperature (°C): 4.0 Ice Present upon delivery:  YES  NODate: 073018

Quality Assurance	Initial	Date	Yes	No
Chain of Custody	<u>VARB</u>	<u>073018</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Refrigerated at 4°C	<u>VARB</u>	<u>073018</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Field Record Received	<u>VARB</u>	<u>073018</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sample Label Affixed Properly	<u>VARB</u>	<u>073018</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Project Leader Informed	<u>VARB</u>	<u>073018</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Comments: \_\_\_\_\_





Ecotoxicology Research Facility

**SAMPLE CHECK IN**

Sample ID Number: #2

Fill out this information with each effluent or river water sample coming in for testing. Keep completed sheets with test data and file with the lab QA/QC officer.

Date: 080118 Sampling Date: 0731-080118 Arrival Time: 1111

Field Identification Number: #2 Description: \_\_\_\_\_

Composite sample

Shipped by: Federal Express \_\_\_\_\_ UPS \_\_\_\_\_ Hand delivered by: WR emp.

Drop-Off Location: ASU-ERF

Storage While Shipped: cooler w/ ice

Analysis Requested: Chronic C. dubia + P. promelas

Initial Water Chemistry Analysis:

Sample Received by: Attwell

Temperature (°C): 1.9

Ice Present upon delivery:  YES  NO

Date: 080118

Quality Assurance	Initial	Date	Yes	No
Chain of Custody	<u>AS</u>	<u>080118</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Refrigerated at 4°C	<u>AS</u>	<u>080118</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Field Record Received	<u>AS</u>	<u>080118</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sample Label Affixed Properly	<u>AS</u>	<u>080118</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Project Leader Informed	<u>AS</u>	<u>080118</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Comments: \_\_\_\_\_

\_\_\_\_\_



Ecotoxicology Research Facility

**SAMPLE CHECK IN**

Sample ID Number: # 3

Fill out this information with each effluent or river water sample coming in for testing. Keep completed sheets with test data and file with the lab QA/QC officer.

Date: 080318 Sampling Date: 0802-080318 Arrival Time: 1132

Field Identification Number: \_\_\_\_\_ Description: \_\_\_\_\_

Composite sample

Shipped by: Federal Express \_\_\_\_\_ UPS \_\_\_\_\_ Hand delivered by: WR emp.

Drop-Off Location: ASU-ERF

Storage While Shipped: Cooler w/ ice

Analysis Requested: Chronic C. dubia & P. promelas

Initial Water Chemistry Analysis:

Sample Received by: AH well

Temperature (°C): 1.1

Ice Present upon delivery:  YES  NO

Date: 080318

Quality Assurance	Initial	Date	Yes	No
Chain of Custody	<u>AS</u>	<u>080318</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Refrigerated at 4°C	<u>AS</u>	<u>080318</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Field Record Received	<u>AS</u>	<u>080318</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sample Label Affixed Properly	<u>AS</u>	<u>080318</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Project Leader Informed	<u>AS</u>	<u>080318</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Comments: \_\_\_\_\_

\_\_\_\_\_