



Ecotoxicology Research Facility



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November 20, 2017

Jonathan Kopp
Walnut Ridge Wastewater Treatment Plant
216 Southwest 4th Street
Walnut Ridge, AR 72476

Dear Jon,

Please find enclosed the results of the 7-day chronic *C. dubia* test using water collected from Walnut Ridge's plant facilities beginning during the week of November 3, 2017. No lethal or sublethal effects were measured in *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 series or any other tests conducted in the past.

Sincerely,

Jennifer L. Bouldin, PhD
Director Ecotoxicology Research Facility
PO Box 847
Arkansas State University
State University, AR 72467

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	11/02/17 1000 hrs to 11/03/17 0900 hrs	11/03/17 1150 hrs	0.2 °C
2	11/05/17 1000 hrs to 11/06/17 0900 hrs	11/05/17 1026 hrs	3.0 °C
3	11/07/17 1000 hrs to 11/08/17 0900 hrs	11/08/17 1100 hrs	0.5 °C

Test Methods:
 7-Day Chronic Toxicity, Static renewal, Cladoceran, EPA 821/R-02/013, Section 13

Organisms: *C. dubia* <24hrs Culture Source: ASU Ecotox

Dilutions: 0%, 32%, 42%, 56%, 80%, 100% Critical Dilution: 100%

Statistical Method: Toxcalc 5.0.25

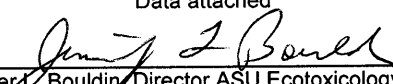
C. dubia

whole effluent toxicity

	lethality	sublethality
DMR Code	22414 10	22414 P0
Result	100%	100%
	lethality	sublethality
DMR Code	TLP3B	TGP3B
Result	0	0
	NOEC lethality	NOEC sublethal
DMR Code	TOP3B	TPP3B
Result	100%	100%
	CV%	
DMR Code	TQP3B	
Result	32.8%	
	control survival	control mean reproduction
	90%	17.3
	critical dil. survival	critical mean reproduction
	80%	18.4
		MSDp
		0.3498

Results Summary: Effluent did not induce lethal or sublethal toxicity to *C. dubia*.

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: 11/3/17 *C. dubia*
 Time Test Started: 1342 *C. dubia*
 Date Test Terminated: 11/10/17 *C. dubia*
 Time Test Terminated: 1358 *C. dubia*
 Laboratory Analyst: Bowen/Cooper

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 ₃)	2340C
pH	4500-H ⁺ 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

II. Test Organisms

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

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 1002)

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 >50% of the culture water consisted of control water.
 Food: Cladocera were fed *Selenastrum* (#ABS 100917) and yeast/cereal/trout chow mix (#YCT-091817) one hour prior to test setup and once daily thereafter.

IV. Quality Assurance

A. Standard Toxicant: Sodium Chloride

B. Organism: *Ceriodaphnia dubia*

Date and time of Reference Toxicant Test

Start: 11/03/17

Terminated: 11/21/17

Time of Reference Toxicant Test

Start: 1707

Terminated: 1310

Laboratory Analyst: Bowen/Rosado-Berrios

Dilution Water Used: Moderately Hard Synthetic Water #1002

Results: Survival and Reproduction within control limits

Survival
 LOEC: 2.60 g/L NaCl
 EC50: 2.19 g/L NaCl

Reproduction
 LOEC: 1.82 g/L NaCl
 IC25: 1.37 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	11/02/17	to	0900	11/03/17
Composite 2:	Collected from	0900	11/05/17	to	0900	11/06/17
Composite 3:	Collected from	0900	11/07/17	to	0900	11/08/17

Test Initiated: 1342

Date: 11/03/17

Time Terminated: 1358

Date: 11/10/17

Dilution H₂O: MH 1000/1001

PERCENT SURVIVAL

Percent Effluent

<u>Time of Reading</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	90	90	100	100	100
7 day	90	80	80	100	100	80

NUMBER OF YOUNG/FEMALE @ 7 DAYS

Percent Effluent

<u>REP</u>	<u>0%</u>	<u>32%</u>	<u>42%</u>	<u>56%</u>	<u>80%</u>	<u>100%</u>
A	25	9	6	20	20	20
B	23	14	22	15	13	22
C	x/0	14	x/0	12	11	x/0
D	12	x/0	14	9	12	16
E	17	x/0	6	18	11	21
F	15	19	x/0	18	10	x/0
G	17	9	11	20	18	24
H	17	18	8	12	27	5
I	14	8	10	23	21	22
J	16	5	17	20	12	17
Mean	17.3	12.0	11.8	16.7	15.5	18.4
CV%*	24.0	41.8	47.9	26.9	36.7	32.8

*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 #TPP3B:
NOEC reproduction 100% effluent
7. Report the % coefficient of variation (largest of critical and control dilutions), Parameter #TQP3B:
CV % reproduction 32.8 % (critical)

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: Hughes/Cooper

Sample No. 1 Collected Ending Date: 11/02/17 Time: 0900
 Sample No. 2 Collected Ending Date: 11/05/17 Time: 0900
 Sample No. 3 Collected Ending Date: 11/07/17 Time: 0900
 Test Begin: Date: 11/03/17 Time: 1342 Test End: Date: 11/10/17 Time: 1342

Initial Water Chemistry for Chronic Tests								
Project: Walnut Ridge <i>C. dubia</i>								
Test day		0	1	2	3	4	5	6
Date		11/3/2017	11/4/2017	11/5/2017	11/6/2017	11/7/2017	11/8/2017	11/9/2017
H ₂ O #		MH 1002	MH 1002	MH 1002	MH 1002	MH 1002	MH 1002	MH 1002
Temp (°C)	Control	22.0	22.0	22.0	22.0	23.0	22.9	22.0
	32%	22.0	22.2	21.9	22.0	22.9	22.8	22.0
	42%	22.0	22.3	22.0	22.1	22.9	22.9	22.1
	56%	22.0	22.5	22.1	22.4	22.9	22.8	22.2
	80%	22.0	22.8	22.0	22.5	22.9	22.9	22.5
	100%	22.0	23.0	22.1	22.4	22.9	22.8	22.2
pH (Standard Units)	Control	7.82	8.00	7.82	7.80	7.70	7.81	7.87
	32%	8.13	8.25	8.13	8.20	8.16	8.10	8.01
	42%	8.20	8.31	8.23	8.28	0.16	8.16	8.12
	56%	8.18	8.31	8.25	8.29	8.21	8.22	8.22
	80%	8.25	8.35	8.27	8.40	8.33	8.27	8.25
	100%	8.27	8.37	8.29	8.39	8.40	8.30	8.24
DO (mg/L)	Control	9.05	8.9	8.6	8.8	8.8	9.0	8.9
	32%	8.88	8.9	8.8	8.7	8.6	8.7	8.9
	42%	8.72	8.9	8.8	8.6	8.5	8.6	9.0
	56%	8.68	8.9	8.7	8.6	8.4	8.5	8.9
	80%	8.63	8.9	8.7	8.5	8.4	8.5	8.8
	100%	8.62	8.9	8.7	8.4	8.2	8.4	8.8
Cond (µS/cm)	Control	279	276	277	276	275	273	275
	32%	293	286	291	287	288	288	289
	42%	298	293	295	294	293	293	293
	56%	305	300	302	300	300	299	299
	80%	316	310	314	311	311	312	313
	100%	327	321	322	321	319	322	324
Alk (mg/L)	Control	62		62		62		
	100%	206		192		198		
Hard (mg/L)	Control	100		100		100		
	100%	200		200		130		

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

Chemical Parameters Chart

Permittee: Walnut Ridge Wastewater Plant Sample No. 1 Collected Ending Date: 11/02/17 Time: 0900
 NPDES No.: AR0046566 Sample No. 2 Collected Ending Date: 11/05/17 Time: 0900
 Contact: Jon Kopp Sample No. 3 Collected Ending Date: 11/07/17 Time: 0900
 Analyst: Hughes/Cooper Test Begin: Date: 11/03/17 Time: 1342 Test End: Date: 11/10/17 Time: 1342

Final Water Chemistry for Chronic Tests								
Project: Walnut Ridge - <i>C. dubia</i>								
Test day		1	2	3	4	5	6	7
Date:		11/4/2017	11/5/2017	11/6/2017	11/7/2017	11/8/2017	11/9/2017	11/10/2017
H ₂ O #		MH 1002	MH 1002	MH 1002	MH 1002	MH 1002	MH 1002	MH 1002
Temp	Control	22.2	22.3	21.7	22.0	23.1	22.3	22.3
	32%	22.8	22.3	22.3	22.0	23.1	22.1	22.2
	42%	22.5	22.0	22.1	22.0	23.1	22.2	22.3
	56%	22.9	22.3	22.5	22.0	23.1	22.3	22.3
	80%	22.8	22.2	22.5	22.0	23.0	22.2	22.2
	100%	22.7	22.4	23.0	22.0	23.0	22.2	22.3
pH (Standard Units)	Control	8.64	8.33	8.06	7.88	8.41	8.52	8.25
	32%	8.74	8.51	8.41	8.24	8.58	8.53	8.58
	42%	8.80	8.58	8.41	8.35	8.56	8.64	8.54
	56%	8.83	8.67	8.47	8.36	8.60	8.68	8.47
	80%	8.84	8.72	8.58	8.48	8.68	8.76	8.67
	100%	8.87	8.74	8.60	8.48	8.65	8.78	8.61
DO (mg/L)	Control	9.2	8.9	9.1	8.8	9.3	8.3	8.9
	32%	9.4	9.0	9.0	8.6	9.4	9.3	8.5
	42%	9.5	9.1	9.1	8.7	9.5	9.2	8.5
	56%	9.6	9.1	9.0	8.7	9.1	9.4	8.3
	80%	9.7	9.2	9.1	8.7	9.2	9.3	8.3
	100%	9.8	9.1	9.2	8.7	9.2	9.4	8.3

Ceriodaphnia Survival and Reproduction Test-7 Day Survival

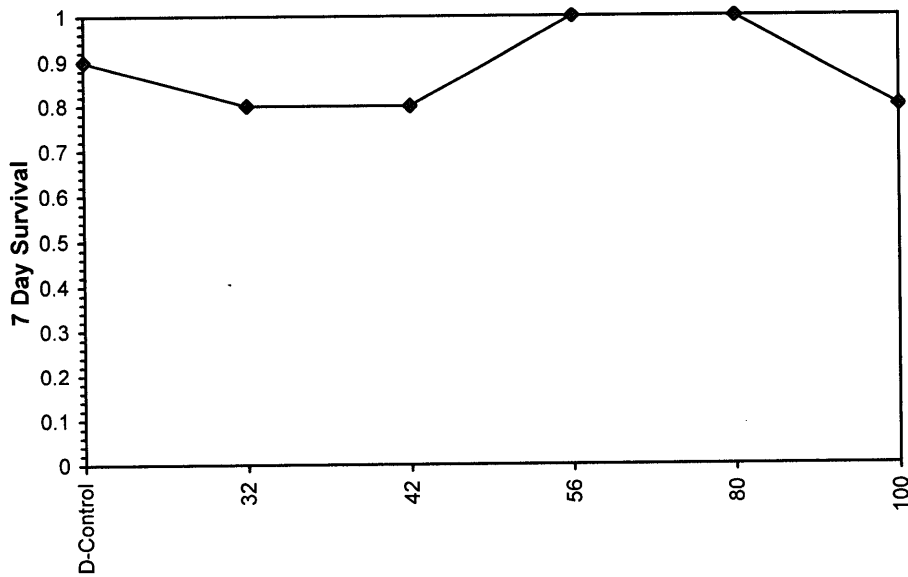
Start Date: 11/3/2017 13:42 Test ID: WR Sample ID: AR46566-NPDES Permit #
 End Date: 11/10/2017 13:58 Lab ID: ASU-ERF Sample Type: EFF1-POTW
 Sample Date: Protocol: EPAF 02-EPA Freshwater Test Species: CD-Ceriodaphnia dubia
 Comments: Nov retest

Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
32	1.0000	1.0000	1.0000	0.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000
42	1.0000	1.0000	0.0000	1.0000	1.0000	0.0000	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	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
100	1.0000	1.0000	0.0000	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000

Conc-%	Mean	N-Mean	Resp	Not Resp	Total	N	Fisher's Exact P	1-Tailed Critical
D-Control	0.9000	1.0000	1	9	10	10		
32	0.8000	0.8889	2	8	10	10	0.5000	0.0500
42	0.8000	0.8889	2	8	10	10	0.5000	0.0500
56	1.0000	1.1111	0	10	10	10	0.5000	0.0500
80	1.0000	1.1111	0	10	10	10	0.5000	0.0500
100	0.8000	0.8889	2	8	10	10	0.5000	0.0500

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	100	>100		1

Dose-Response Plot



Ceriodaphnia Survival and Reproduction Test-Reproduction

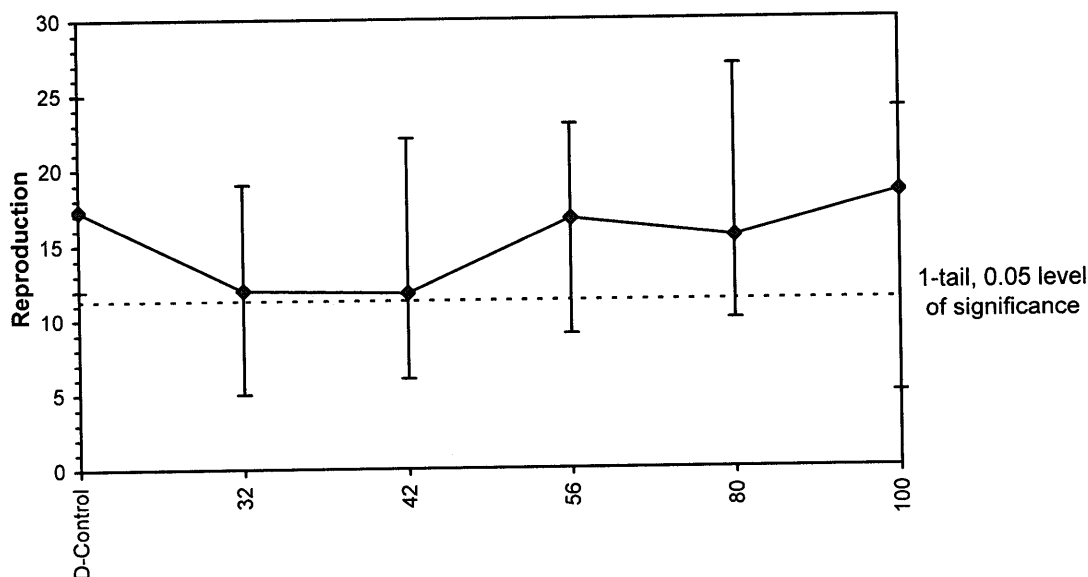
Start Date: 11/3/2017 13:42 Test ID: WR Sample ID: AR46566-NPDES Permit #
 End Date: 11/10/2017 13:58 Lab ID: ASU-ERF Sample Type: EFF1-POTW
 Sample Date: Protocol: EPAF 02-EPA Freshwater Test Species: CD-Ceriodaphnia dubia
 Comments: Nov Wet test

Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	25.000	23.000	12.000	17.000	15.000	17.000	17.000	14.000	16.000	
32	9.000	14.000	14.000	19.000	9.000	18.000	8.000	5.000		
42	6.000	22.000	14.000	6.000	11.000	8.000	10.000	17.000		
56	20.000	15.000	12.000	9.000	18.000	18.000	20.000	12.000	23.000	20.000
80	20.000	13.000	11.000	12.000	11.000	10.000	18.000	27.000	21.000	12.000
100	20.000	22.000	16.000	21.000	24.000	5.000	22.000	17.000		

Conc-%	Mean	N-Mean	Transform: Untransformed					N	t-Stat	1-Tailed Critical	MSD
			Mean	Min	Max	CV%					
D-Control	17.333	1.0000	17.333	12.000	25.000	23.961	9				
32	12.000	0.6923	12.000	5.000	19.000	41.786	8	2.118	2.408	6.064	
42	11.750	0.6779	11.750	6.000	22.000	47.874	8	2.217	2.408	6.064	
56	16.700	0.9635	16.700	9.000	23.000	26.935	10	0.266	2.408	5.734	
80	15.500	0.8942	15.500	10.000	27.000	36.654	10	0.770	2.408	5.734	
100	18.375	1.0601	18.375	5.000	24.000	32.774	8	-0.414	2.408	6.064	

Auxiliary Tests	Statistic	Critical	Skew	Kurt						
Kolmogorov D Test indicates normal distribution ($p > 0.01$)	0.57891	1.035	0.04364	0.00778						
Bartlett's Test indicates equal variances ($p = 0.91$)	1.55708	15.0863								
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	100	>100		1	6.06392	0.34984	64.0956	26.8505	0.05208	5, 47

Dose-Response Plot



CHRONIC TEST DATA SHEET
Ceriodaphnia dubia

Project: Walnut Ridge MH Beginning Date: 110317 Time: 1342 Test Species: C. dubia
Dilution H₂O: 1002 Ending Date: 111017 Time: 1358 Age: <24 hrs

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	4	4	6	11	25	
	2	↓	↓	↓	5	3	9	6	23	
	3	↓	↓	↓	x/0	—————→				x/0
	4	↓	↓	↓	0	4	1	7	12	
	5	↓	↓	↓	0	2	4	11	17	
	6	↓	↓	↓	0	4	2	9	15	
	7	↓	↓	↓	0	3	5	9	17	
	8	↓	↓	↓	0	3	4	10	17	
	9	↓	↓	↓	0	2	4	8	14	
	10	↓	↓	↓	2	2	0	12	16	
32%	1	0	0	0	0	1	7	1	9	
	2	↓	↓	↓	1	5	8	0	14	
	3	↓	↓	↓	0	2	12	0	14	
	4	↓	x/0	—————→				1	x/0	
	5	↓	0	0	x/0	—————→				x/0
	6	↓	↓	↓	0	8	10	1	19	
	7	↓	↓	↓	0	3	0	6	9	
	8	↓	↓	↓	5	0	7	6	18	
	9	↓	↓	↓	0	1	0	7	8	
	10	↓	↓	↓	0	0	0	5	5	
Date	110317	110417	110517	110617	110717	110817	110917	111017		
Initials	NB	RIC	RIC	awe	NB	NB	gs	gs	gs	

CHRONIC TEST DATA SHEET
Ceriodaphnia dubia

Project: Walnut Ridge MH Beginning Date: 110317 Time: 1342 Test Species: C. dubia
Dilution H₂O: 1002 Ending Date: 111017 Time: 1358 Age: <24 hrs

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	0	2	4	0	6					
	2	↓	0	0	4	0	8	10	22					
	3		x/0	—————→							x/0			
	4		0	0	3	0	11	14						
	5		↓	↓	↓	0	0	0	6	6				
	6					x/0	—————→							x/0
	7					0	3	8	0	11				
	8					0	2	0	6	8				
	9					0	0	0	10	10				
	10					0	4	0	13	17				
56%	1					0	0	0	0	5	12	3	20	
	2	↓				↓	↓	0	2	12	1	15		
	3							0	3	9	0	12		
	4							0	0	0	9	9		
	5		3	6	9			0	18					
	6		4	0	0			14	18					
	7		0	2	2			16	20					
	8		0	1	11			0	12					
	9		2	5	0			16	23					
	10		3	0	0			17	20					
Date	110317		110417	110517	110617			110717	110817	110917	111017			
Initials	NB	RIC	RIC	AUR	NB	NB	P	P	P					

CHRONIC TEST DATA SHEET
Ceriodaphnia dubia

Project: Walnut Ridge Beginning Date: 110317 Time: 1342 Test Species: C. dubia
Dilution H₂O: M-H1002 Ending Date: 111017 Time: 1358 Age: 424hr

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	0	10	10	0	20
	2	↓	↓	↓	0	4	9	0	13
	3	↓	↓	↓	5	6	0	0	11
	4	↓	↓	↓	0	9	3	0	12
	5	↓	↓	↓	0	5	6	0	11
	6	↓	↓	↓	0	5	5	0	10
	7	↓	↓	↓	0	9	7	2	18
	8	↓	↓	↓	4	8	0	15	27
	9	↓	↓	↓	4	3	0	14	21
	10	↓	↓	↓	4	0	7	1	12
100%	1	0	0	0	1	3	0	16	20
	2	↓	↓	↓	0	10	12	0	22
	3	↓	↓	↓	x/0	—————→			x/0
	4	↓	↓	↓	0	2	0	14	16
	5	↓	↓	↓	3	6	0	12	21
	6	↓	↓	↓	x/0	—————→			x/0
	7	↓	↓	↓	2	5	2	15	24
	8	↓	↓	↓	0	3	2	0	5
	9	↓	↓	↓	0	0	0	12	22
	10	↓	↓	↓	0	1	8	8	17
Date	110317	110417	110517	110617	110717	110817	110917	111017	
Initials	NB	RIC	RIC	AMR	NB	NB	P	P	P

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

Test Day:		0	1	2	3	4	5	6
Date:		110317	110417	110517	110617	110717	110817	110917
H ₂ O Batch #:		MH1002	MH1002	MH1002	MH1002	MH1002	MH1002	MH1002
Temp. (°C)	Control	22.0	22.0	22.0	22.0	23.0	22.9	22.0
	32%	22.0	22.2	21.9	22.0	22.9	22.8	22.0
	42%	22.0	22.3	22.0	22.1	22.9	22.9	22.1
	56%	22.0	22.5	22.1	22.4	22.9	22.8	22.2
	80%	22.0	22.8	22.0	22.5	22.9	22.9	22.2
	100%	22.0	23.0	22.1	22.4	22.9	22.8	22.2
pH	Control	7.82	8.00	7.82	7.80	7.70	7.81	7.87
	32%	8.13	8.25	8.13	8.20	8.16	8.10	8.01
	42%	8.20	8.31	8.23	8.28	8.16	8.16	8.12
	56%	8.18	8.31	8.25	8.29	8.21	8.22	8.22
	80%	8.25	8.35	8.27	8.40	8.33	8.29	8.25
	100%	8.27	8.37	8.29	8.39	8.40	8.30	8.24
DO (mg/L)	Control	9.05 ^{NR}	8.9	8.6	8.4	8.4	9.0	8.9
	32%	8.88	8.9	8.8	8.7	8.6	8.7	8.9
	42%	8.72	8.9	8.8	8.6	8.5	8.6	9.0
	56%	8.68	8.9	8.7	8.6	8.37	8.5	8.9
	80%	8.63	8.9	8.7	8.5	8.4	8.5	8.8
	100%	8.62	8.9	8.7	8.4	8.2	8.4	8.8
Cond. (µS/cm)	Control	279 279 ^{NR}	276	277	276	275	273	275
	32%	293	286	291	287	288	288	289
	42%	298	293	295	294	293	293	293
	56%	305	300	302	300	300	299	299
	80%	316	310	314	311	311	312	313
	100%	327	321	322	321	319	322	324
Alk. (mg/L)	Control	62			62		62	
	100%	206			192		198	
Hard. (mg/L)	Control	100			100		100	
	100%	200			200		180	
Initials		NB/uc	RLC	RLC	NB/uc	NB	NB/uc	JD

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

Test Day:		1	2	3	4	5	6	7
Date:		110417	110517	110617	110717	110817	110917	111017
H ₂ O Batch #:		MH1002	MH1002	MH1002	MH1002	MH1002	MH1002	MH1002
Temp. (°C)	Control	22.2	22.3	21.7	22.0	23.1	22.3	22.3
	32%	22.8	22.3	22.3	22.0	23.1	22.1	22.2
	42%	22.5	22.0	22.1	22.0	23.1	22.2	22.3
	56%	22.9	22.3	22.5	22.0	23.1	22.3	22.3
	80%	22.8	22.2	22.5	22.0	23.0	22.2	22.2
	100%	22.7	22.4	23.0	22.0	23.0	22.2	22.3
pH	Control	8.64	8.33	8.66	7.88	8.41	8.52	8.25
	32%	8.74	8.51	8.41	8.24	8.58	8.53	8.58
	42%	8.80	8.58	8.41	8.35	8.56	8.64	8.54
	56%	8.83	8.67	8.47	8.36	8.60	8.68	8.47
	80%	8.84	8.72	8.58	8.48	8.68	8.76	8.67
	100%	8.87	8.74	8.60	8.48	8.65	8.78	8.61
DO (mg/L)	Control	9.2	8.9	9.1	8.8	9.3	9.3	8.9
	32%	9.4	9.0	8.9 ^{ave}	8.6	9.4	9.3	8.5
	42%	9.5	9.1	9.1	8.7	9.5	9.3	8.5
	56%	9.6	9.1	9.0	8.7	9.1	9.4	8.3
	80%	9.7	9.2	9.1	8.7	9.2	9.3	8.3
	100%	9.8	9.1	8.9 ^{ave}	8.7	9.2	9.4	8.3
Initials		RIC	RIC	AWL	NB	NB	P	P



Ecotoxicology Research Facility

SAMPLE CHECK IN

Sample ID Number: WR #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: 110317 Sampling Date: 110217 - 110317 Arrival Time: 1150

Field Identification Number: _____ Description: Comp

Shipped by: Federal Express _____ UPS _____ Hand delivered by: WR employees

Drop-Off Location: ASU-ERF

Storage While Shipped: Cooler w/ice

Analysis Requested: Chronic C.dubia

Initial Water Chemistry Analysis:

Sample Received by: R. Cooper

Temperature (°C): 0.2 Ice Present upon delivery: YES NO

Date: 110317

Quality Assurance	Initial	Date	Yes	No
Chain of Custody	RIC	110317	X	
Refrigerated at 4°C	RIC	110317	X	
Field Record Received	RIC	110317		X
Sample Label Affixed Properly	RIC	110317	X	
Project Leader Informed	RIC	110317	X	

Comments: _____



Ecotoxicology Research Facility

SAMPLE CHECK INSample ID Number: WR #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: 11/06/17 Sampling Date: 11/05/17 - 11/06/17 Arrival Time: 1026

Field Identification Number: _____ Description: _____

Shipped by: Federal Express _____ UPS _____ Hand delivered by: WR employees

Drop-Off Location: ASU-ERF

Storage While Shipped: cooler w ice

Analysis Requested: chronic c. dubia

Initial Water Chemistry Analysis:

Sample Received by: Irene Sanchez

Temperature (°C): 3.0°C Ice Present upon delivery: YES NO

Date: 11/06/17

Quality Assurance	Initial	Date	Yes	No
Chain of Custody	ISG	11/06/17	X	
Refrigerated at 4°C	ISG	11/06/17	X	
Field Record Received	ISG	11/06/17		X
Sample Label Affixed Properly	ISG	11/06/17		X
Project Leader Informed	ISG	11/06/17	X	

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: 110817 Sampling Date: 11/11-8-2017 Arrival Time: 1100am

Field Identification Number: _____ Description: Comp POTW effluent

Shipped by: Federal Express _____ UPS _____ Hand delivered by: WR employees

Drop-Off Location: ASU-ERF

Storage While Shipped: Cooler w/ice

Analysis Requested: chronic c. dubia

Initial Water Chemistry Analysis:

Sample Received by: C. Beason

Temperature (°C): 0.5c Ice Present upon delivery: YES NO

Date: 110817

Quality Assurance	Initial	Date	Yes	No
Chain of Custody	CB	110817	X	
Refrigerated at 4°C	CB	110817	X	
Field Record Received	CB	110817		X
Sample Label Affixed Properly	CB	110817	X	
Project Leader Informed	CB	110817	X	

Comments: _____



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 Walnut Ridge Wastewater Treatment		Phone: (870) 886-2312						
Project #		Fax:						
Sampler (sign) 		PO #:						
Remarks: Contact: Jonathan Kopp		Analyses (List Below)						
Cont. #	Sample ID	Location	Sample Date	Sample Time	Sample Type	Matrix	Chronic C. dubia	Chronic P. promelas
1	001	Cell 001	11-7/11-8-17	9 AM/9 AM	Comp	Aqueous		
					Grab	Soil		
					Other			
Ice present at delivery:		Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>						
Temp:		0.1 °C		Initials				
1. Relinquished By (sign) 		Date 11-8-17		Time 9:30 AM		Date 11-8-17		Time 11:00 AM
2. Relinquished By (sign) 		Date		Time		Date		Time