



Ecotoxicology Research Facility



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December 14, 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 December 5, 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	12/05/17 1000 hrs to 12/06/17 0900 hrs	12/06/17 1022 hrs	1.0 °C
2	12/07/17 1000 hrs to 12/08/17 0900 hrs	12/08/17 1135 hrs	-0.5°C
3	12/10/17 1000 hrs to 12/11/17 0900 hrs	12/11/17 1117hrs	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

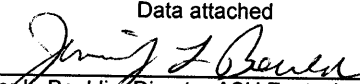
C. dubia

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	25.5%	
control survival	control mean reproduction	
100%	22.8	
critical dil. survival	critical mean reproduction	
100%	25.6	
	MSDp	
	0.2443	

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: 12/06/17 *C. dubia*
 Time Test Started: 1445 *C. dubia*
 Date Test Terminated: 12/13/17 *C. dubia*
 Time Test Terminated: 1020 *C. dubia*
 Laboratory Analyst: Ruby/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 111817) and yeast/cereal/trout chow mix (#YCT-102017) one hour prior to test setup and once daily thereafter.

IV. Quality Assurance

A. Standard Toxicant: Sodium Chloride

B. Organism: *Ceriodaphnia dubia*

Start: 12/08/17
Terminated: 12/15/17
Time of Reference Toxicant Test
Start: 1241
Terminated: 1141
Laboratory Analyst: Cooper/Ruby
Dilution Water Used: Moderately Hard Synthetic Water #1005
Results: Survival and Reproduction within control limits

<u>Survival</u>	<u>Reproduction</u>
LOEC: 2.60 g/L NaCl	LOEC: 1.82 g/L NaCl
EC50: 2.11 g/L NaCl	IC25: 1.64 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	12/05/17	to	0900	12/06/17
Composite 2:	Collected from	0900	12/07/17	to	0900	12/08/17
Composite 3:	Collected from	0900	12/10/17	to	0900	12/11/17

Test Initiated: 1445

Date: 12/06/17

Time Terminated: 1020

Date: 12/13/17

Dilution H₂O: MH 1004/1005

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	100	100

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	22	20	28	20	24	29
B	24	29	27	28	26	21
C	23	31	17	34	20	30
D	23	28	22	25	24	25
E	7	25	9	19	27	18
F	25	26	32	29	24	34
G	24	24	32	20	22	20
H	27	25	26	31	30	20
I	26	28	31	30	26	30
J	27	33	25	31	35	29
Mean	22.8	26.9	24.9	26.7	25.8	25.6
CV%*	25.5	13.8	29.2	20.1	16.4	21.6

*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 25.5 % (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: Bouldin/Cooper

Sample No. 1 Collected Ending Date: 12/06/17 Time: 0900
 Sample No. 2 Collected Ending Date: 12/08/17 Time: 0900
 Sample No. 3 Collected Ending Date: 12/11/17 Time: 0900
 Test Begin: Date: 12/06/17 Time: 1445 Test End: Date: 12/13/17 Time: 1020

Initial Water Chemistry for Chronic Tests								
Project: Walnut Ridge – <i>C. dubia</i>								
Test day		0	1	2	3	4	5	6
Date		12/6/2017	12/7/2017	12/8/2017	12/9/2017	12/10/2017	12/11/2017	12/12/2017
H ₂ O #		MH 1004	MH 1005	MH 1005	MH 1005	MH 1005	MH 1005	MH 1005
Temp (°C)	Control	23.0	22.2	24.0	22.0	22.8	22.2	23.1
	32%	22.9	22.4	24.0	22.0	22.8	22.5	23.1
	42%	23.0	22.3	23.9	22.0	23.0	22.8	22.9
	56%	23.0	22.0	24.2	22.0	23.0	23.0	23.0
	80%	22.8	22.0	24.1	22.0	22.9	23.0	23.0
	100%	23.1	22.1	24.3	22.0	23.0	23.2	23.1
pH (Standard Units)	Control	7.71	7.45	7.57	7.56	7.78	7.74	7.60
	32%	7.94	7.73	7.88	7.85	8.07	8.10	8.10
	42%	8.01	7.79	8.00	7.97	8.13	8.24	8.17
	56%	8.04	7.84	8.07	8.06	8.21	8.28	8.23
	80%	8.10	7.89	8.13	8.12	8.25	8.33	8.26
	100%	8.10	7.93	8.18	8.15	8.27	8.37	8.29
DO (mg/L)	Control	8.80	8.6	8.9	9.1	8.6	8.8	8.7
	32%	8.60	8.6	8.7	9.1	8.7	8.6	8.4
	42%	8.50	8.6	8.7	8.6	8.6	8.6	8.3
	56%	8.40	8.6	8.7	8.5	8.6	8.5	8.3
	80%	8.40	8.6	8.6	8.5	8.6	8.4	8.3
	100%	8.30	8.6	8.6	8.5	8.5	8.4	8.2
Cond (µS/cm)	Control	277	264	265	264	265	267	266
	32%	292	277	280	273	280	282	277
	42%	296	283	285	278	285	288	283
	56%	302	291	292	284	291	296	289
	80%	315	304	306	296	303	310	291
	100%	325	315	318	306	314	322	311
Alk (mg/L)	Control	59	58	58			58	
	100%	188		178			212	
Hard (mg/L)	Control	100	90	90			90	
	100%	200		200			220	

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

Permittee: Walnut Ridge Wastewater Plant
 NPDES No.: AR0046566
 Contact: Jon Kopp
 Analyst: Bouldin/Cooper

Sample No. 1 Collected Ending Date: 12/06/17 Time: 0900
 Sample No. 2 Collected Ending Date: 12/08/17 Time: 0900
 Sample No. 3 Collected Ending Date: 12/11/17 Time: 0900

Test Begin: Date: 12/06/17 Time: 1445 Test End: Date: 12/13/17 Time: 1020

Final Water Chemistry for Chronic Tests								
Project: Walnut Ridge - <i>C. dubia</i>								
Test day		1	2	3	4	5	6	7
Date:		12/7/2017	12/8/2017	12/9/2017	12/10/2017	12/11/2017	12/12/2017	12/13/2017
H ₂ O #		MH 1004	MH 1005	MH 1005	MH 1005	MH 1005	MH 1005	MH 1005
Temp	Control	22.1	23.0	22.1	23.2	23.0	22.9	22.5
	32%	23.0	23.3	22.1	23.0	23.0	23.0	22.8
	42%	22.0	23.3	22.0	22.9	23.0	22.3	23.0
	56%	22.2	24.0	22.1	23.0	23.2	22.6	23.3
	80%	22.0	24.0	22.0	22.9	23.2	22.9	22.9
	100%	22.1	24.0	22.0	23.2	23.0	22.9	23.0
pH (Standard Units)	Control	7.73	8.00	7.97	7.91	7.98	7.72	8.09
	32%	7.86	8.22	8.03	8.19	8.22	8.01	8.32
	42%	7.92	8.29	8.11	8.21	8.29	8.08	8.39
	56%	8.00	8.37	8.18	8.32	8.31	8.19	8.49
	80%	8.11	8.43	8.27	8.36	8.43	8.25	8.50
	100%	8.15	8.44	8.32	8.38	8.49	8.32	8.52
DO (mg/L)	Control	9.1	8.9	8.9	8.8	9.1	8.9	9.1
	32%	8.8	8.6	8.8	8.8	8.8	8.6	9.0
	42%	8.8	8.6	8.8	8.8	8.8	8.6	9.0
	56%	8.8	8.7	8.8	8.8	8.8	8.6	9.0
	80%	8.8	8.7	8.8	8.8	8.7	8.5	9.0
	100%	8.8	8.8	8.8	8.8	8.8	8.5	9.0

Ceriodaphnia Survival and Reproduction Test-7 Day Survival

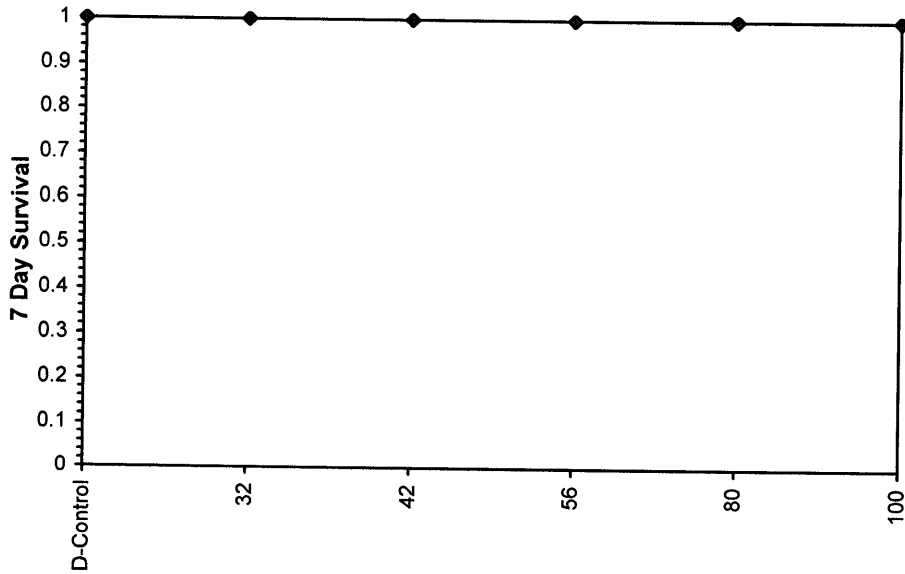
Start Date: 12/6/2017 14:45 Test ID: Walnut Rid Sample ID: AR0046566-NPDES Permit
 End Date: 12/13/2017 10:20 Lab ID: ASU-ERF Sample Type: EFF1-POTW
 Sample Date: 12/6/2017 Protocol: EPAF 02-EPA Freshwater Test Species: CD-Ceriodaphnia dubia
 Comments: Dec WET

Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	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	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	1.0000	1.0000	1.0000	1.0000	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	1.0000	1.0000	0	10	10	10		
32	1.0000	1.0000	0	10	10	10	1.0000	0.0500
42	1.0000	1.0000	0	10	10	10	1.0000	0.0500
56	1.0000	1.0000	0	10	10	10	1.0000	0.0500
80	1.0000	1.0000	0	10	10	10	1.0000	0.0500
100	1.0000	1.0000	0	10	10	10	1.0000	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: 12/6/2017 14:45 Test ID: Walnut Rid Sample ID: AR0046566-NPDES Permit
 End Date: 12/13/2017 10:20 Lab ID: ASU-ERF Sample Type: EFF1-POTW
 Sample Date: 12/6/2017 Protocol: EPAF 02-EPA Freshwater Test Species: CD-Ceriodaphnia dubia
 Comments: Dec WET

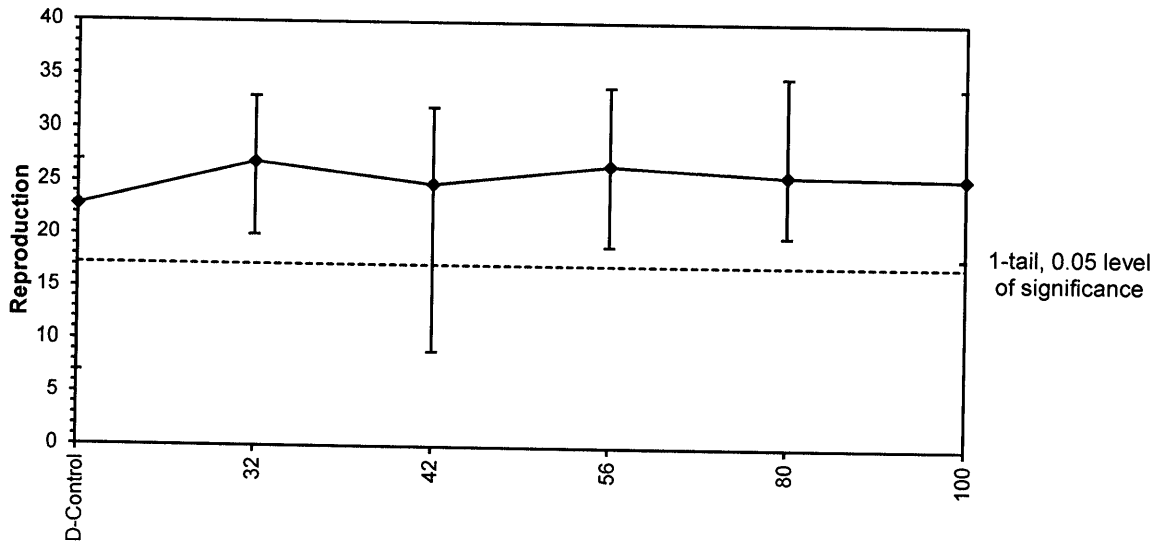
Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	22.000	24.000	23.000	23.000	7.000	25.000	24.000	27.000	26.000	27.000
32	20.000	29.000	31.000	28.000	25.000	26.000	24.000	25.000	28.000	33.000
42	28.000	27.000	17.000	22.000	9.000	32.000	32.000	26.000	31.000	25.000
56	20.000	28.000	34.000	25.000	19.000	29.000	20.000	31.000	30.000	31.000
80	24.000	26.000	20.000	24.000	27.000	24.000	22.000	30.000	26.000	35.000
100	29.000	21.000	30.000	25.000	18.000	34.000	20.000	20.000	30.000	29.000

Conc-%	Mean	N-Mean	Transform: Untransformed					t-Stat	1-Tailed Critical	MSD
			Mean	Min	Max	CV%	N			
D-Control	22.800	1.0000	22.800	7.000	27.000	25.474	10			
32	26.900	1.1798	26.900	20.000	33.000	13.849	10	-1.683	2.287	5.569
42	24.900	1.0921	24.900	9.000	32.000	29.234	10	-0.862	2.287	5.569
56	26.700	1.1711	26.700	19.000	34.000	20.134	10	-1.601	2.287	5.569
80	25.800	1.1316	25.800	20.000	35.000	16.424	10	-1.232	2.287	5.569
100	25.600	1.1228	25.600	18.000	34.000	21.569	10	-1.150	2.287	5.569

Auxiliary Tests

Kolmogorov D Test indicates normal distribution ($p > 0.01$)	Statistic	Critical	Skew	Kurt						
Bartlett's Test indicates equal variances ($p = 0.45$)	0.84478	1.035	-0.90344	1.25742						
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test	100	>100		1	5.56909	0.24426	22.27	29.6574	0.58906	5, 54

Dose-Response Plot



CHRONIC TEST DATA SHEET
Ceriodaphnia dubia

Project: Walnut Ridge MH Beginning Date: 120617 Time: 1445 Test Species: C. dubia

Dilution H₂O: 1004 Ending Date: 121317 Time: 1020 Age: <24 hrs
MH1005

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	3	9	6	11	22
	2	↓	↓	↓	5	8	0	11	24
	3	↓	↓	↓	5	0	10	8	23
	4	↓	↓	↓	4	0	8	11	23
	5	↓	↓	↓	3	0	0	4	7
	6	↓	↓	↓	5	8	0	12	25
	7	↓	↓	↓	4	6	2	12	24
	8	↓	↓	↓	4	8	0	15	27
	9	↓	↓	↓	5	9	0	12	26
	10	↓	↓	↓	3	9	0	15	27
32%	1	0	0	0	2	9	0	9	20
	2	↓	↓	↓	5	8	0	16	29
	3	↓	↓	↓	6	9	0	16	31
	4	↓	↓	↓	5	11	12	0	28
	5	↓	↓	↓	5	8	0	13	25
	6	↓	↓	↓	3	8	0	15	26
	7	↓	↓	↓	5	9	0	10	24
	8	↓	↓	↓	5	7	0	13	25
	9	↓	↓	↓	4	10	0	14	28
	10	↓	↓	↓	5	13	0	15	33
Date	120617	120717	120817	120917	121017	121117	121217	121317	
Initials	RIC	RIC	awr	JP	RIC	RIC	awr	JP	

CHRONIC TEST DATA SHEET

Ceriodaphnia dubia

Project: Walnut Ridge MH Beginning Date: 120617 Time: 1445 Test Species: C.dubia

Dilution H₂O: 1004 Ending Date: 121317 Time: 1020 Age: <24 hrs
MH1005

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	8	0	13	28
	2	↓	↓	↓	4	9	0	14	27
	3	↓	↓	↓	3	6	8	0	17
	4	↓	↓	↓	3	7	0	12	22
	5	↓	↓	↓	4	4	0	1	9
	6	↓	↓	↓	6	10	0	16	32
	7	↓	↓	↓	5	1	9	17	32
	8	↓	↓	↓	3	7	0	16	26
	9	↓	↓	↓	5	10	0	16	31
	10	↓	↓	↓	6	7	0	12	25
56%	1	0	0	0	0	6	0	14	20
	2	↓	↓	↓	4	8	0	16	28
	3	↓	↓	↓	5	13	0	16	34
	4	↓	↓	↓	4	9	0	12	25
	5	↓	↓	↓	3	5	1	10	19
	6	↓	↓	↓	4	0	9	16	29
	7	↓	↓	↓	3	8	0	9	20
	8	↓	↓	↓	6	11	0	14	31
	9	↓	↓	↓	6	10	0	14	30
	10	↓	↓	↓	4	10	0	17	31
Date	120617	120717	120817	120917	121017	121117	121217	121317	
Initials	RIC	RIC	aur	js	RIC	RIC	aur	js	

CHRONIC TEST DATA SHEET

Ceriodaphnia dubia

Project: Walnut Ridge MH Beginning Date: 120617 Time: 1445 Test Species: C.dubia

Dilution H₂O: 1004 Ending Date: 121317 Time: 1020 Age: <24 hrs
MH1005

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	5	6	0	13	24
	2				5	7	0	14	26
	3				3	4	0	13	20
	4				0	8	0	16	24
	5				2	0	9	16	27
	6				3	7	0	14	24
	7				4	5	0	13	22
	8				4	11	0	15	30
	9				6	0	7	13	26
	10		↓	↓	↓	5	1	11	18
100%	1	0	0	0	4	9	0	16	29
	2				3	6	0	12	21
	3				5	10	1	14	30
	4				4	7	0	14	25
	5				5	2	0	11	18
	6				7	10	6	17	34
	7				5	10	0	15	20
	8				4	5	0	11	20
	9				6	0	9	15	30
	10		↓	↓	↓	4	0	9	16
Date	120617	120717	120817	120917	121017	121117	121217	121317	
Initials	RIC	RIC	AW2	JP	RIC	RIC	AW	JP	

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

Test Day:		0	1	2	3	4	5	6
Date:		120617	120717	120817	120917	121017	121117	121217
H ₂ O Batch #:		MH1004	MH1005	MH1005	MH1005	MH1005	MH1005	MH1005
Temp. (°C)	Control	23.0	22.2	24.0	22.0	22.8	22.2	23.1
	32%	22.9	22.4	24.0	22.0	22.8	22.5	23.1
	42%	23.0	22.3	23.9	22.0	23.0	22.8	22.9
	56%	23.0	22.0	24.2	22.0	23.0	23.0	23.0
	80%	22.8	22.0	24.1	22.0	22.9	23.0	23.0
	100%	23.1	22.1	24.3	22.0	23.0	23.2	23.1
pH	Control	7.71	7.45	7.57	7.56	7.78	7.74	7.60
	32%	7.94	7.73	7.88	7.85	8.07	8.10	8.10
	42%	8.01	7.79	8.00	7.97	8.13	8.24	8.17
	56%	8.04	7.84	8.07	8.06	8.21	8.28	8.23
	80%	8.10	7.89	8.13	8.12	8.25	8.33	8.26
	100%	8.10	7.93	8.18	8.15	8.27	8.37	8.29
DO (mg/L)	Control	8.8	8.6	8.9	9.1	8.6	8.8	8.7
	32%	8.6	8.6	8.7	9.1	8.7	8.6	8.4
	42%	8.5	8.6	8.7	8.6	8.6	8.6	8.3
	56%	8.4	8.6	8.7	8.5	8.6	8.5	8.3
	80%	8.4	8.6	8.6	8.5	8.6	8.4	8.3
	100%	8.3	8.6	8.6	8.5	8.5	8.4	8.2
Cond. (µS/cm)	Control	277	264	265	264	265	267	266
	32%	292	277	280	273	280	282	277
	42%	296	283	285	278	285	288	283
	56%	302	291	292	284	291	296	289
	80%	315	304	306	296	303	310	291
	100%	325	315	318	306	314	322	311
Alk. (mg/L)	Control	59	58	58		58	58	
	100%	188		178		184 ^{RLC}	212	
Hard. (mg/L)	Control	100	90	90		90	90	
	100%	175		200		200 ^{RLC}	220	
Initials		RLC/AA	RLC/AA	AWR/RLC	<i>gf</i>	RLC	RLC	<i>gf</i>

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

Test Day:		1	2	3	4	5	6	7
Date:		120717	120817	120917	121017	121117	121217	121317
H ₂ O Batch #:		MH1004	MH1005	MH1005	MH1005	MH1005	MH1005	MH1005
Temp. (°C)	Control	22.1	23.0	22.1	23.2	23.0	22.9	22.5
	32%	23.0	23.3	22.1	23.0	23.0	23.0	22.8
	42%	22.0	23.3	22.0	22.9	23.0	22.3	23.0
	56%	22.2	24.0	22.1	23.0	23.2	22.4	23.3
	80%	22.0	24.0	22.0	22.9	23.2	22.9	22.9
	100%	22.1	24.0	22.0	23.2	23.0	22.9	23.0
pH	Control	7.73	8.00	8.97	7.91	7.98	7.72	8.09
	32%	7.86	8.22	8.03	8.19	8.22	8.01	8.32
	42%	7.92	8.29	8.11	8.21	8.29	8.08	8.39
	56%	8.00	8.37	8.18	8.32	8.31	8.19	8.49
	80%	8.11	8.43	8.27	8.36	8.43	8.25	8.50
	100%	8.15	8.44	8.32	8.38	8.49	8.32	8.52
DO (mg/L)	Control	9.1	8.9	8.9	8.8	9.1	8.9	9.1
	32%	8.8	8.6	8.8	8.8	8.8	8.6	9.0
	42%	8.8	8.6	8.8	8.8	8.8	8.6	9.0
	56%	8.8	8.7	8.8	8.8	8.8	8.6	9.0
	80%	8.8	8.7	8.8	8.8	8.7	8.5	9.0
	100%	8.8	8.8	8.8	8.8	8.8	8.5	9.0
Initials		RLC	AWR	J	RLC	AWR	AWR	AWR



Ecotoxicology Research Facility

SAMPLE CHECK IN

Sample ID Number: WR#2 | CB

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: 120617 Sampling Date: 120517 - 120617 Arrival Time: 1022

Field Identification Number: WR002 Description: Composite

Shipped by: Federal Express _____ UPS _____ Hand delivered by: Walnut Ridge personnel

Drop-Off Location: ASU-ERF

Storage While Shipped: Cooler w ice

Analysis Requested: Chronic C. dubia

Initial Water Chemistry Analysis:

Sample Received by: MM

Temperature (°C): 1.0

Ice Present upon delivery: YES NO

Date: 120617

Quality Assurance	Initial	Date	Yes	No
Chain of Custody	MM	120617	X	
Refrigerated at 4°C	MM	↓	X	
Field Record Received	MM			X
Sample Label Affixed Properly	MM			X
Project Leader Informed	MM	✓	X	

Comments: _____



Ecotoxicology Research Facility

SAMPLE CHECK IN

Sample ID Number: WR # 3/ 2 CB

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: 120817 Sampling Date: 120717-120817 Arrival Time: 1135

Field Identification Number: WR003 Description: composite

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

Drop-Off Location: ASU-ERF

Storage While Shipped: Cooler w/ice

Analysis Requested: Chronic E. dubia

Initial Water Chemistry Analysis:

Sample Received by: RIC

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

Date: 120817

Quality Assurance	Initial	Date	Yes	No
Chain of Custody	RIC	120817	X	
Refrigerated at 4°C	RIC	↓	X	
Field Record Received	RIC			X
Sample Label Affixed Properly	RIC		X	
Project Leader Informed	RIC		X	

Comments: _____



Ecotoxicology Research Facility

SAMPLE CHECK IN

Sample ID Number: WR #4 3 cp

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: 12117 Sampling Date: 121017-12117 Arrival Time: 1117

Field Identification Number: _____ Description: Composite

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

Drop-Off Location: ASU-ERF

Storage While Shipped: Cooler w/ice

Analysis Requested: chronic C. dubia

Initial Water Chemistry Analysis:

Sample Received by: RIC

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

Date: 12117

Quality Assurance	Initial	Date	Yes	No
Chain of Custody	RIC	12117	X	
Refrigerated at 4°C	RIC	↓	X	
Field Record Received	RIC			X
Sample Label Affixed Properly	RIC		X	
Project Leader Informed	RIC		X	


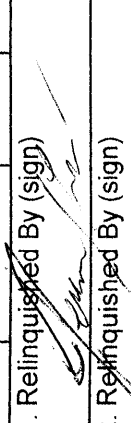
Comments: _____



Ecotology 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) 				Remarks: Contact: Jonathan Kopp									
Cont#	Sample ID Number	Location	Sample Date	Sample Time	Sample Type		Matrix	Analyses (List Below)					
					Comp	Grab	Aqueous		Soil	Other			
			12-5	12-6	9am	9am	9am				Chronic C. dubia		
											Chronic P. promelas		
Ice present at delivery: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No													
Temp:	40°C	MM Initials											
1. Relinquished By (sign) 	Date	12-6-17	Time	10:19am	1. Received By (sign) Monica Maland			Date	120617	Time	1022		
2. Relinquished By (sign)	Date		Time		2. Received By (sign)			Date		Time			



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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 Number	Location	Sample Date	Sample Time	Sample Type Comp <input type="checkbox"/> Grab <input checked="" type="checkbox"/>	Matrix		Chronic <i>C. dubia</i>	Chronic <i>P. promelas</i>
						Aqueous	Soil		
			12-7 to 12-8	9am - 9am					
Ice present at delivery:			<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No						
Temp:			-0.5 °C		RIC		Initials		
1. Relinquished By (sign) 			Date	Time	1. Received By (sign) <i>Robert L. Cooper</i>		Date	Time	
2. Relinquished By (sign)			Date	Time	2. Received By (sign)		Date	Time	



Ecotoxicology Research Facility

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Arkansas State University

2645 Gaddo Drive

State University, AR 72467

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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 Number	Location	Sample Date	Sample Time	Sample Type			Matrix		Chroni C. dubia	Chroni P. promelas
					Comp	Grab	Aqueous	Soil	Other		
1	EFF 001		10-10-17	9AM							
			10-11-17	9AM							
Ice present at delivery: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No											
Temp: 0.5 °C			DAC Initials								
1. Relinquished By (sign) 			Date 10-11-17		Time 11:16 AM		1. Received By (sign) Rebecca Cope		Date 12/11/17		Time 1117
2. Relinquished By (sign)			Date		Time		2. Received By (sign)		Date		Time