

Ecotoxicology Research Facility



P.O. Box 847
State University, AR 72467
Tel. 870-972-2570
Fax 870-972-2577
<http://ecotox.astate.edu/>

College of Sciences & Mathematics
www.astate.edu

August 1, 2012

Scotty Jones
Trumann POTW
106 Main Street
Trumann, AR 72472

Dear Scotty,

Please find enclosed the results of the 7-day chronic tests using water collected from your plant facilities during the weeks of July 15, 2012. Neither lethal nor sublethal effects were measured in *Pimephales promelas* exposed to the treated effluent dilutions. However, the *Ceriodaphnia dubia* test was deemed invalid due to control survival of 70%. A retest at no additional charge has been scheduled for August 13th.

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

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

Sincerely,

A handwritten signature in black ink, appearing to read "Jennifer L. Bouldin".

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

Arkansas State University Ecotoxicology Facility

Laboratory Report

Facility Director / Contact: Jennifer L. Bouldin, PhD
Phone: (870) 972-2570

Client: City of Trumann
106 East Main Street
Trumann, AR 72472

Contact: Scotty Jones
(870) 483-6343

NPDES Permit #: AR0035602

AFIN#: 56-00047

Effluent Sampling Point/Type: 24hr Composite

Samples Collected:

Sample #	Sampling Times	Received	Arrival Temp
1	7/15/12 0800 hrs to 7/16/12 0800 hrs	7/16/12 0840 hrs	5.0°C
2	7/17/12 0800 hrs to 7/18/12 0800 hrs	7/18/12 0845 hrs	6.0°C
3	7/19/12 0800 hrs to 7/20/12 0800 hrs	7/20/12 0840 hrs	2.0°C

Test Methods:

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

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

Organisms: *P. promelas* <24hrs
C. dubia <24hrs

Culture Source: ASU Ecotox

Dilutions: 0%, 4%, 5%, 7%, 9%, 12%

Critical Dilution: 9%

Statistical Method: Toxcalc 5.0.25

Results:

	<i>P. promelas</i>	<i>C. dubia</i>
NOEC Survival:	12%	12%
Pass/Fail (0=pass; 1=fail):	0	0
NOEC Growth/Reproduction:	12%	7%
Pass/Fail (0=pass; 1=fail):	0	0
Control Survival:	100%	70%
Control % CV Growth/Reproduction:	8.0	46.0
Critical Dilution % CV Growth/Reproduction:	12.3	33.4
Mean Weight/ # Neonates in Control:	0.3165 mg	11.4
Mean Weight/ # of Neonates in Critical Dilution:	0.3812 mg	6.8
MSDp Growth/ Reproduction		0.3865
Daily Average Minimum NOEC:	12%	12%
7-Day Minimum NOEC:	12%	12%


Results Summary: Neither lethal or sublethal effects were measured in *P. promelas* exposed to treated effluent or dilution mixtures.

C. dubia test was deemed invalid due to decreased control survival (70%).

Retest for *C. dubia* is scheduled for August 13th.

QA/Reference Testing: Data attached

Reviewed By:


Jennifer L. Bouldin, Ecotoxicology Research Facility, Director

Toxicity Test Performed: 7-day *Pimephales promelas* Survival and Growth
 Effluent Sampling Point: City of Trumann
 Date Test Started: 07/16/12 *P. promelas*
 Time Test Started: 1530 *P. promelas*
 Date Test Terminated: 07/23/12 *P. promelas*
 Time Test Terminated: 1540 *P. promelas*
 Laboratory Analyst: Rosado-Berrios

Toxicity Test Performed: 7-day *Ceriodaphnia dubia* Survival and Reproduction
 Effluent Sampling Point: City of Trumann
 Date Test Started: 07/16/12 *C. dubia*
 Time Test Started: 1450 *C. dubia*
 Date Test Terminated: 07/23/12 *C. dubia*
 Time Test Terminated: 1440 *C. dubia*
 Laboratory Analyst: Griffin

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>
Fathead Minnow Survival and Growth	Section 11
Cladoceran Survival and Reproduction	Section 13

II. Test Organisms

- A. Name: *Pimephales promelas* (Fathead minnow)
 Source: Laboratory Culture
 Age: <24 hours
 Life Stage: Larval

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

III. External Factors

A. Incubator

Temperature (°C)

Average: 24.6

Range: 24.5 – 25.0

Light Cycle: 16 hours light/ 8 hours dark

Light Intensity: 100 footcandles

Control Water: Moderately Hard Synthetic Water #869/870

B. *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 >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.

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 062712) and yeast/cereal/trout chow mix (#YCT 060612-5/6/8/9) one hour prior to test setup and once daily thereafter.

IV. Quality Assurance

A. Standard Toxicant: Sodium Chloride

B. Organism: *Pimephales promelas*

Date of Reference Toxicant Test

Start: 07/03/12

Terminated: 07/10/12

Time of Reference Toxicant Test

Start: 1155

Terminated: 1145

Laboratory Analyst: Freyaldenhoven

Dilution Water Used: Moderately Hard Synthetic Water #867

Results: Survival and Growth within control limits

Survival

LOEC: 4.22 g/L NaCl

EC50: 4.63 g/L NaCl

Growth

LOEC: >5.63 g/L NaCl

IC25: >5.63 g/L NaCl

C. Organism: *Ceriodaphnia dubia*

Date and time of Reference Toxicant Test

Start: 07/05/12

Terminated: 07/13/12

Time of Reference Toxicant Test

Start: 1515

Terminated: 1515

Laboratory Analyst: Freyaldenhoven

Dilution Water Used: Moderately Hard Synthetic Water #867

Results: Survival and Reproduction within control limits

Survival

LOEC: 2.60 g/L NaCl

EC50: 1.77 g/L NaCl

Reproduction

LOEC: 0.62 g/L NaCl

IC25: 1.04 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
Fathead Minnow Larvae (*Pimephales promelas*) Survival and Growth

Permittee: City of Trumann – Trumann, AR

NPDES No: AR0035602

		<u>Time</u>	<u>Date</u>		<u>Time</u>	<u>Date</u>
Composite 1:	Collected From	0800	07/15/12	to	0800	07/16/12
Composite 2:	Collected From	0800	07/17/12	to	0800	07/18/12
Composite 3:	Collected From	0800	07/19/12	to	0800	07/20/12

Test Initiated: 1530

Date: 07/16/12

Time Terminated: 1540

Date: 07/23/12

Dilution H₂O: MH 869/870

DATA TABLE FOR SURVIVAL

Effluent Conc. %	Replicate Chambers					Mean % Survival			CV%
	A	B	C	D	E	24h	48h	7days	
Control	100	100	100	100	100	100	100	100	0.0
4	50	87.5	100	100	63	100	85	80	24.5
5	87.5	100	100	100	100	97.5	97.5	97.5	6.1
7	100	87.5	100	100	87.5	100	97.5	95	7.6
9	100	100	100	100	75	100	100	95	11.7
12	87.5	87.5	100	100	100	100	100	95	7.6

DATA TABLE FOR GROWTH

Effluent Conc %	Replicate Chambers (mg)					Mean Dry Weight (mg)	CV%
	A	B	C	D	E		
Control	0.3375	0.2900	0.2875	0.3362	0.3312	0.3165	8.0
4	0.4875	0.3286	0.2375	0.2562	0.1560	0.2932	42.6
5	0.3129	0.2450	0.2912	0.3063	0.2987	0.2908	9.2
7	0.3500	0.3243	0.3188	0.3637	0.3314	0.3376	5.6
9	0.3187	0.3675	0.3762	0.3950	0.4483	0.3812	12.3
12	0.4600	0.4157	0.4112	0.3788	0.3762	0.4084	8.3

Coefficient of Variation = Standard Deviation x 100/Mean

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

1. FISHER'S EXACT TEST:

Is the mean survival for the critical dilution (9%) at 7 days significantly different ($p=0.05$) than the control survival?

_____ Yes X 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 (9%) significantly different ($p=0.05$) than the growth in control exposures?

_____ Yes X No

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

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

5. Report the NOEC value for survival, Parameter #TOP6C:
NOEC survival 12 % effluent

6. Report the NOEC value for growth, Parameter #TPP6C:
NOEC growth 12 % effluent

7. Report the % coefficient of variation (largest of critical and control dilutions), Parameter #TQP6C: CV % growth 12.3% (critical dilution)

Whole Effluent Lethality Values

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

Daily Average Minimum NOEC: 12%

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

7-Day Minimum NOEC: 12%

SUMMARY REPORTING FORM

WET Testing

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

Permittee: City of Trumann

Sample No. 1 Collected

Ending Date: 07/16/12 Time: 0800

NPDES No.: AR0035602

Sample No. 2 Collected

Ending Date: 07/18/12 Time: 0800

Contact: Scotty Jones

Sample No. 3 Collected

Ending Date: 07/20/12 Time: 0800

Analyst: Rosado-Berrios

Test Begin: Date: 07/16/12 Time: 1530

Test End: Date: 07/23/12 Time: 1540

Initial Water Chemistry for Chronic Tests

Project: Trumann – *P. promelas*

Test day		0	1	2	3	4	5	6
Date		7/16/2012	7/17/2012	7/18/2012	7/19/2012	7/20/2012	7/21/2012	7/22/2012
H ₂ O #		MH 869	MH 869	MH 869	MH 870	MH 870	MH 870	MH 870
Temp (°C)	Control	22.8	22.0	22.1	22.5	23.0	22.5	22.3
	4%	22.8	22.0	22.0	22.6	23.2	22.5	22.3
	5%	22.8	22.0	22.0	22.4	23.1	22.5	22.3
	7%	22.8	22.1	22.0	22.4	23.1	22.5	22.3
	9%	22.8	22.0	22.0	22.5	23.0	22.5	22.3
	12%	22.8	22.1	22.1	22.6	23.0	22.5	22.3
pH (Standard Units)	Control	7.70	7.83	7.65	7.84	7.78	7.72	7.70
	4%	7.73	7.88	7.75	7.86	7.83	7.76	7.76
	5%	7.78	7.90	7.75	7.88	7.84	7.77	7.78
	7%	7.82	7.91	7.77	7.88	7.85	7.79	7.78
	9%	7.83	7.94	7.79	7.88	7.86	7.80	7.79
	12%	7.85	7.97	7.81	7.88	7.86	7.84	7.80
DO (mg/L)	Control	8.4	8.2	8.0	8.4	8.4	8.4	8.2
	4%	8.2	8.1	8.2	8.4	7.8	8.5	8.0
	5%	7.7	8.2	7.8	8.1	7.9	8.7	8.0
	7%	7.5	8.4	8.1	8.4	8.5	8.5	7.7
	9%	7.9	8.4	7.7	8.4	8.3	8.6	8.2
	12%	7.9	8.2	7.8	8.1	8.2	8.6	8.3
Cond (µS/cm)	Control	330	327	330	313	314	312	310
	4%	338	336	336	320	321	323	319
	5%	340	338	339	322	324	324	321
	7%	343	341	343	327	327	326	326
	9%	347	344	348	331	332	331	330
	12%	352	349	354	336	338	337	336
Alk (mg/L)	Control	62		62		64		
	12%	70		70		140		
Hard (mg/L)	Control	90		90		90		
	12%	100		100		50		

SUMMARY REPORTING FORM

WET Testing

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

Permittee: City of Trumann

Sample No. 1 Collected

Ending Date: 07/16/12 Time: 0800

NPDES No.: AR0035602

Sample No. 2 Collected

Ending Date: 07/18/12 Time: 0800

Contact: Scotty Jones

Sample No. 3 Collected

Ending Date: 07/20/12 Time: 0800

Analyst: Rosado-Berrios

Test Begin: Date: 07/16/12 Time: 1530

Test End: Date: 07/23/12 Time: 1540

Final Water Chemistry for Chronic Tests

Project: Trumann- *P. promelas*

Test day		1	2	3	4	5	6	7
Date		7/17/2012	7/18/2012	7/19/2012	7/20/2012	7/21/2012	7/22/2012	7/23/2012
H ₂ O #		MH 869	MH 869	MH 870	MH 870	MH 870	MH 870	MH 870
Temp (°C)	Control	23.0	23.5	23.0	23.0	22.5	22.5	23.7
	4%	23.0	23.5	23.0	23.0	22.5	22.5	24.0
	5%	23.0	23.5	23.0	23.0	22.5	22.5	23.9
	7%	23.0	23.5	23.0	23.0	22.5	22.5	24.2
	9%	23.0	23.5	23.0	23.0	22.5	22.5	24.5
	12%	23.0	23.5	23.0	23.0	22.5	22.5	24.7
pH (Standard Units)	Control	7.49	7.13	7.28	7.61	7.36	7.31	7.34
	4%	7.55	7.28	7.42	7.64	7.37	7.39	7.44
	5%	7.58	7.28	7.47	7.67	7.46	7.46	7.45
	7%	7.59	7.33	7.43	7.65	7.45	7.41	7.40
	9%	7.60	7.33	7.45	7.66	7.49	7.53	7.47
	12%	7.63	7.43	7.52	7.70	7.48	7.54	7.47
DO (mg/L)	Control	7.9	5.2	8.9	7.5	6.8	7.1	7.3
	4%	8.9	5.5	8.7	7.4	6.4	7.1	7.7
	5%	7.8	5.0	6.4	7.3	6.8	7.0	7.0
	7%	7.9	5.6	5.9	7.4	6.6	7.3	6.9
	9%	7.9	5.2	5.9	7.3	6.6	7.0	7.3
	12%	8.0	6.2	6.3	7.3	6.4	7.1	7.0

SUMMARY REPORTING FORM
WET Testing
Ceriodaphnia dubia Survival and Reproduction

Permittee: City of Trumann – Trumann, AR

NPDES No: AR0035602

		<u>Time</u>	<u>Date</u>	to	<u>Time</u>	<u>Date</u>
Composite 1:	Collected From	0800	07/15/12		0800	07/16/12
Composite 2:	Collected From	0800	07/17/12		0800	07/18/12
Composite 3:	Collected From	0800	07/19/12		0800	07/20/12

Test Initiated: 1530

Date: 07/16/12

Time Terminated: 1540

Date: 07/23/12

Dilution H₂O: MH 869/870

PERCENT SURVIVAL

Percent Effluent

<u>Time of Reading</u>	<u>0%</u>	<u>4%</u>	<u>5%</u>	<u>7%</u>	<u>9%</u>	<u>12%</u>
24h	100	100	100	100	100	100
48h	100	100	100	100	100	100
7 day	70	90	100	100	80	100

NUMBER OF YOUNG/FEMALE @ 7 DAYS

Percent Effluent

<u>REP</u>	<u>0%</u>	<u>4%</u>	<u>5%</u>	<u>7%</u>	<u>9%</u>	<u>12%</u>
A	X/0	X/3	9	4	9	5
B	17	8	15	5	7	8
C	9	7	14	9	8	11
D	15	14	7	13	4	9
E	8	15	3	10	7	8
F	X/0	4	9	4	10	8
G	9	11	9	16	4	6
H	4	8	8	5	5	7
I	X/0	12	6	13	X/0	13
J	18	7	3	11	X/0	9
Mean	11.4	9.6	8.3	9.0	6.8	8.4
CV%*	46.0	38.1	47.9	48.0	33.4	27.6

*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 (9%) at 7 days significantly different ($p=0.05$) than the control survival?
 Yes X 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 (9%) significantly different ($p=0.05$) than the control's number of young per female?
 Yes X No

3. If the NOEC for survival is less than the critical dilution, enter [1], otherwise enter [0] for parameter #TGP3B: 0

4. If the NOEC for reproduction is less than the critical dilution, enter [1], otherwise enter [0] for parameter #TLP3B: 0

5. Report the NOEC value for survival, Parameter #TOP3B:
NOEC survival 12 % effluent

6. Report the NOEC value for reproduction, Parameter #TPP3B:
NOEC reproduction 7 % effluent

7. Report the % coefficient of variation (largest of critical and control dilutions), Parameter #TQP3B:
CV % reproduction 46.0 % (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: 12%

2. Report the Whole Effluent Lethality values for the 7-day minimum, Parameter #22414:
7-Day Minimum NOEC: 12%

CHRONIC TOXICITY SUMMARY FORM
WET Testing *Ceriodaphnia dubia* (Cladoceran)
CHEMICAL PARAMETERS CHART

Permittee: City of Trumann

Sample No. 1 Collected

Ending Date: 07/16/12 Time: 0800

NPDES No.: AR0035602

Sample No. 2 Collected

Ending Date: 07/18/12 Time: 0800

Contact: Scotty Jones

Sample No. 3 Collected

Ending Date: 07/20/12 Time: 0800

Analyst: Griffin

Test Begin: Date: 07/16/12 Time: 1450

Test End: Date: 07/23/12 Time: 1440

Initial Water Chemistry for Chronic Tests								
Project: Trumann - <i>C. dubia</i>								
Test day		0	1	2	3	4	5	6
Date		7/16/2012	7/17/2012	7/18/2012	7/19/2012	7/20/2012	7/21/2012	7/22/2012
H ₂ O #		MH 869	MH 869	MH 869	MH 870	MH 870	MH 870	MH 870
Temp (°C)	Control	22.8	22.0	22.1	22.5	23.0	22.5	22.3
	4%	22.8	22.0	22.0	22.6	23.2	22.5	22.3
	5%	22.8	22.0	22.0	22.4	23.1	22.5	22.3
	7%	22.8	22.1	22.0	22.4	23.1	22.5	22.3
	9%	22.8	22.0	22.0	22.5	23.0	22.5	22.3
	12%	22.8	22.1	22.1	22.6	23.0	22.5	22.3
pH (Standard Units)	Control	7.70	7.83	7.65	7.84	7.78	7.72	7.70
	4%	7.73	7.88	7.75	7.86	7.83	7.76	7.76
	5%	7.78	7.90	7.75	7.88	7.84	7.77	7.78
	7%	7.82	7.91	7.77	7.88	7.85	7.79	7.78
	9%	7.83	7.94	7.79	7.88	7.86	7.80	7.79
	12%	7.85	7.97	7.81	7.88	7.86	7.84	7.80
DO (mg/L)	Control	8.4	8.2	8.0	8.4	8.4	8.4	8.2
	4%	8.2	8.1	8.2	8.4	7.8	8.5	8.0
	5%	7.7	8.2	7.8	8.1	7.9	8.7	8.0
	7%	7.5	8.4	8.1	8.4	8.5	8.5	7.7
	9%	7.9	8.4	7.7	8.4	8.3	8.6	8.2
	12%	7.9	8.2	7.8	8.1	8.2	8.6	8.3
Cond (µS/cm)	Control	330	327	330	313	314	312	310
	4%	338	336	336	320	321	323	319
	5%	340	338	339	322	324	324	321
	7%	343	341	343	327	327	326	326
	9%	347	344	348	331	332	331	330
	12%	352	349	354	336	338	337	336
Alk (mg/L)	Control	62		62		64		
	12%	70		70		140		
Hard (mg/L)	Control	90		90		90		
	12%	100		100		50		

CHRONIC TOXICITY SUMMARY FORM
WET Testing *Ceriodaphnia dubia* (Cladoceran)
CHEMICAL PARAMETERS CHART

Permittee: City of Trumann

Sample No. 1 Collected

Ending Date: 07/16/12 Time: 0800

NPDES No.: AR0035602

Sample No. 2 Collected

Ending Date: 07/18/12 Time: 0800

Contact: Scotty Jones

Sample No. 3 Collected

Ending Date: 07/20/12 Time: 0800

Analyst: Griffin

Test Begin: Date: 07/16/12 Time: 1450 Test End: Date: 07/23/12 Time: 1440

Final Water Chemistry for Chronic Tests								
Project: Trumann – <i>C. dubia</i>								
Test day		1	2	3	4	5	6	7
Date:		7/17/2012	7/18/2012	7/19/2012	7/20/2012	7/21/2012	7/22/2012	7/23/2012
H ₂ O #		MH 869	MH 869	MH 870	MH 870	MH 870	MH 870	MH 870
Temp (°C)	Control	22.7	22.2	23.0	23.0	22.5	23.1	23.4
	4%	22.7	22.2	23.0	23.0	22.5	23.1	23.4
	5%	22.2	22.2	22.9	23.0	22.5	23.2	23.4
	7%	22.5	22.2	23.0	23.0	22.6	23.1	23.4
	9%	22.4	22.2	23.0	23.0	22.5	23.1	23.4
	12%	22.5	22.3	23.0	23.0	22.5	23.1	23.4
pH (Standard Units)	Control	7.60	7.65	7.69	7.79	7.65	7.93	7.65
	4%	7.79	7.83	7.85	7.95	7.80	8.06	7.97
	5%	7.85	7.88	7.91	8.05	7.84	8.05	7.89
	7%	7.87	7.93	7.93	8.11	7.85	8.07	7.90
	9%	7.97	8.03	8.05	8.20	8.00	8.13	7.89
	12%	7.93	8.02	8.00	8.16	7.96	8.09	8.24
DO (mg/L)	Control	7.6	7.9	9.2	8.2	8.8	7.8	7.4
	4%	7.8	7.8	9.2	8.1	8.3	8.5	8.4
	5%	9.2	7.5	9.2	8.2	8.2	8.6	8.0
	7%	8.6	8.1	8.4	8.5	8.4	8.9	8.4
	9%	8.8	8.0	8.6	8.2	8.1	9.0	8.5
	12%	8.2	8.4	8.4	8.0	8.4	8.4	9.1

Larval Fish Growth and Survival Test-7 Day Survival

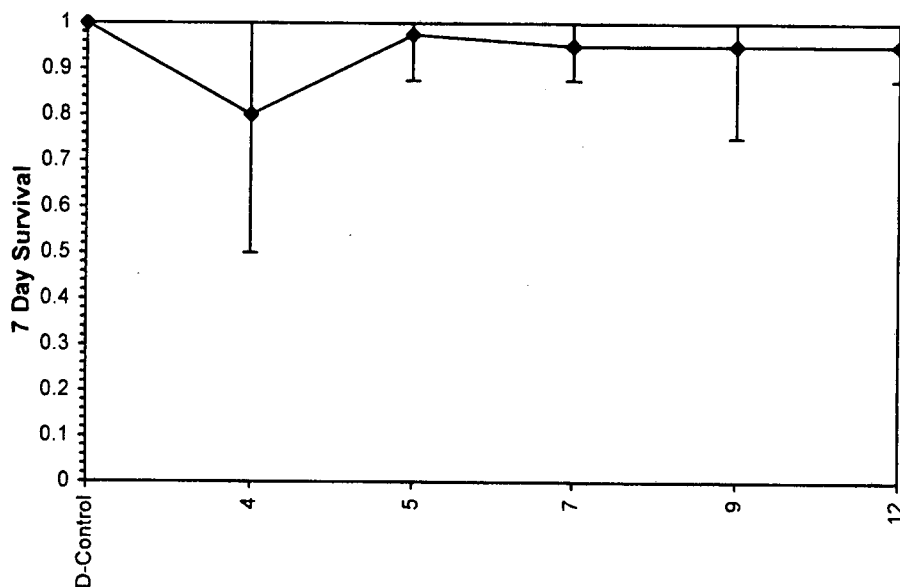
Start Date: 7/16/2012 15:30 Test ID: Jul-12 Sample ID: NPDES Permit #AR0035602
 End Date: 7/23/2012 15:40 Lab ID: ASU ERF Sample Type: EFF1-POTW
 Sample Date: Protocol: EPAF02-EPA Freshwater Test Species: PP-Pimephales promelas
 Comments:

Conc-%	1	2	3	4	5
D-Control	1.0000	1.0000	1.0000	1.0000	1.0000
4	0.5000	0.8750	1.0000	1.0000	0.6250
5	0.8750	1.0000	1.0000	1.0000	1.0000
7	1.0000	0.8750	1.0000	1.0000	0.8750
9	1.0000	1.0000	1.0000	1.0000	0.7500
12	0.8750	0.8750	1.0000	1.0000	1.0000

Conc-%	Mean	N-Mean	Transform: Arcsin Square Root					Rank Sum	1-Tailed Critical
			Mean	Min	Max	CV%	N		
D-Control	1.0000	1.0000	1.3931	1.3931	1.3931	0.000	5		
4	0.8000	0.8000	1.1385	0.7854	1.3931	24.481	5	20.00	16.00
5	0.9750	0.9750	1.3564	1.2094	1.3931	6.055	5	25.00	16.00
7	0.9500	0.9500	1.3196	1.2094	1.3931	7.623	5	22.50	16.00
9	0.9500	0.9500	1.3239	1.0472	1.3931	11.684	5	25.00	16.00
12	0.9500	0.9500	1.3196	1.2094	1.3931	7.623	5	22.50	16.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01) Equality of variance cannot be confirmed	0.88327	0.9	-0.7535	1.22126
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	12	>12		8.33333

Dose-Response Plot



Larval Fish Growth and Survival Test-7 Day Growth

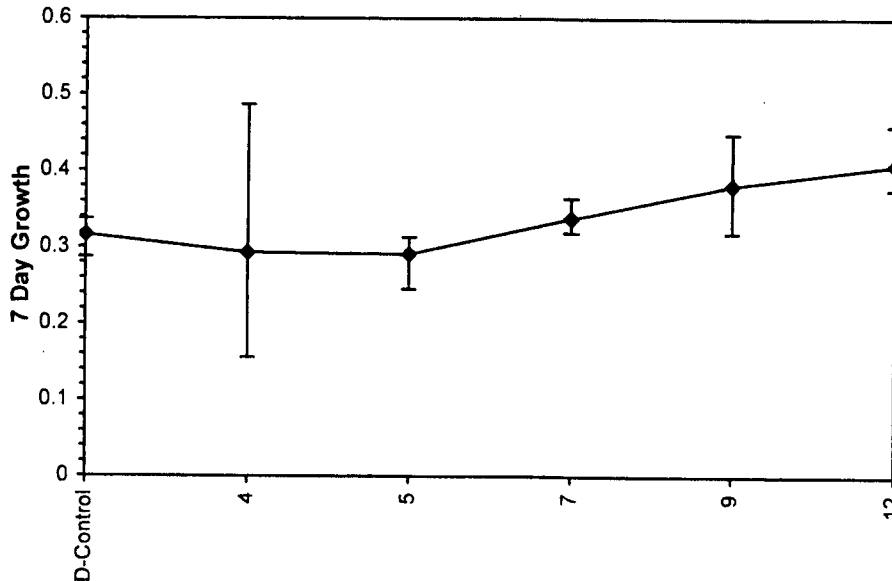
Start Date: 7/16/2012 15:30 Test ID: Jul-12 Sample ID: NPDES Permit #AR0035602
 End Date: 7/23/2012 15:40 Lab ID: ASU ERF Sample Type: EFF1-POTW
 Sample Date: Protocol: EPAF 02-EPA Freshwater Test Species: PP-Pimephales promelas
 Comments:

Conc-%	1	2	3	4	5
D-Control	0.3375	0.2900	0.2875	0.3362	0.3312
4	0.4875	0.3286	0.2375	0.2562	0.1560
5	0.3129	0.2450	0.2912	0.3063	0.2987
7	0.3500	0.3243	0.3188	0.3637	0.3314
9	0.3187	0.3675	0.3762	0.3950	0.4483
12	0.4600	0.4157	0.4112	0.3788	0.3762

Conc-%	Mean	N-Mean	Transform: Untransformed				N	Rank Sum	1-Tailed Critical
			Mean	Min	Max	CV%			
D-Control	0.3165	1.0000	0.3165	0.2875	0.3375	8.043	5		
4	0.2932	0.9263	0.2932	0.1560	0.4875	42.568	5	22.00	16.00
5	0.2908	0.9189	0.2908	0.2450	0.3129	9.237	5	23.00	16.00
7	0.3376	1.0668	0.3376	0.3188	0.3637	5.557	5	32.00	16.00
9	0.3812	1.2043	0.3812	0.3187	0.4483	12.312	5	37.00	16.00
12	0.4084	1.2903	0.4084	0.3762	0.4600	8.337	5	40.00	16.00

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.87182	0.9	1.12351	6.30207
Bartlett's Test indicates unequal variances (p = 1.15E-03)	20.1931	15.0863		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Steel's Many-One Rank Test	12	>12		8.33333

Dose-Response Plot



CHRONIC TEST DATA SHEET

Pimephales promelas

Project: Trumann Beginning Date: 071612 Time: 1530 Test Species: P. promelas

Dilution H₂O: MH869 Ending Date: 072312 Time: 1540 Age: <24h
MH870

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	OK-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
4%	1	8/0	8/4	4/0	4/0	4/0	4/0	4/0	T-6
	2	8/0	8/0	8/0	8/0	8/0	8/1	7/0	-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	8/0	-9
	5	8/0	8/2	6/0	6/0	6/0	6/0	5/0	-10
5%	1	8/0	8/1	7/0	7/0	7/0	7/0	7/0	-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
7%	1	8/0	8/0	8/0	8/0	8/0	8/0	8/0	-16
	2	8/0	8/1	7/0	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	8/1	↓ -20
Date		071712	071812	071912	072012	072112	072212	072312	072312
Initials		CARB	CARB	CARB	CARB	TB	UNC	UNC	MS/HF

CHRONIC TEST DATA SHEET
Pimephales promelas

Project: Trumann Beginning Date: 7/14/12 Time: 1530 Test Species: P. promelas

Dilution H₂O: M4869 Ending Date: 072312 Time: 1540 Age: 24 hours
M4876

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

Conc.	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Pan #
9%	1	8/0	8/0	8/0	8/0	8/0	8/0	8/0	16HF 21
	2	8/0	8/0	8/0	8/0	8/0	8/0	8/0	17HF 22
	3	8/0	8/0	8/0	8/0	8/0	8/0	8/0	18HF 23
	4	8/0	8/0	8/0	8/0	8/0	8/0	8/0	19HF 24
	5	8/0	8/0	8/0	8/0	8/0	8/0	8/2	20HF 25
12%	1	8/0	8/0	8/0	8/0	8/0	8/1	7/0	21HF 26
	2	8/0	8/0	8/0	8/0	8/0	8/0	8/1	22HF 27
	3	8/0	8/0	8/0	8/0	8/0	8/0	8/0	23HF 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		071712	071812	071912	072012	072112	072212	072312	072312
Initials		CARB	CARB	CARB	CARB	TR	UNC	UNC	HF/MG

Ceriodaphnia Survival and Reproduction Test-7 Day Survival

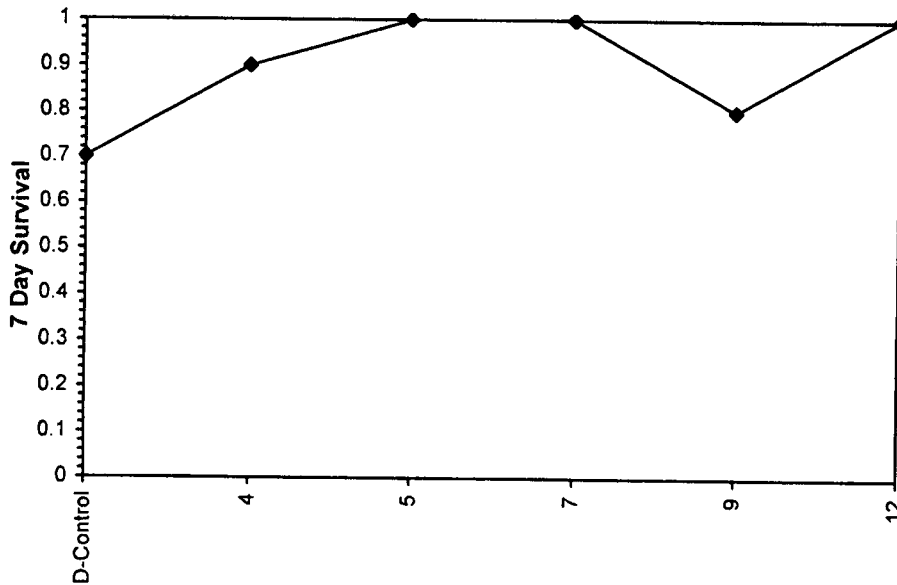
Start Date: 7/16/2012 14:50 Test ID: Jul-12 Sample ID: NPDES Permit #AR0035602
 End Date: 7/23/2012 14:40 Lab ID: ASU ERF Sample Type: EFF1-POTW
 Sample Date: 07/16/12 Protocol: EPAF 02-EPA Freshwater Test Species: CD-Ceriodaphnia dubia
 Comments: 3rd Quarter WET Testing

Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	0.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000	1.0000	0.0000	1.0000
4	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
7	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
9	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000
12	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	0.7000	1.0000	3	7	10	10		
4	0.9000	1.2857	1	9	10	10	0.2910	0.0500
5	1.0000	1.4286	0	10	10	10	0.1053	0.0500
7	1.0000	1.4286	0	10	10	10	0.1053	0.0500
9	0.8000	1.1429	2	8	10	10	0.5000	0.0500
12	1.0000	1.4286	0	10	10	10	0.1053	0.0500

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	12	>12		8.33333

Dose-Response Plot



Ceriodaphnia Survival and Reproduction Test-Reproduction

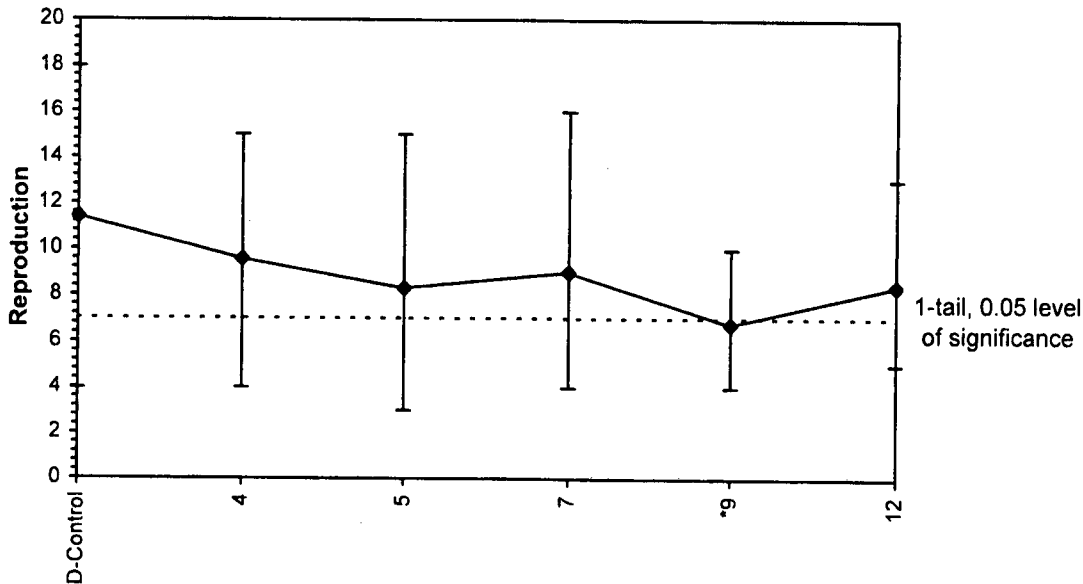
Start Date: 7/16/2012 14:50 Test ID: Jul-12 Sample ID: NPDES Permit #AR0035602
 End Date: 7/23/2012 14:40 Lab ID: ASU ERF Sample Type: EFF1-POTW
 Sample Date: 07/16/12 Protocol: EPAF 02-EPA Freshwater Test Species: CD-Ceriodaphnia dubia
 Comments: 3rd Quarter WET Testing

Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	17.000	9.000	15.000	8.000	9.000	4.000	18.000			
4	8.000	7.000	14.000	15.000	4.000	11.000	8.000	12.000	7.000	
5	9.000	15.000	14.000	7.000	3.000	9.000	9.000	8.000	6.000	3.000
7	4.000	5.000	9.000	13.000	10.000	4.000	16.000	5.000	13.000	11.000
9	9.000	7.000	8.000	4.000	7.000	10.000	4.000	5.000		
12	5.000	8.000	11.000	9.000	8.000	8.000	6.000	7.000	13.000	9.000

Conc-%	Mean	N-Mean	Transform: Untransformed					N	t-Stat	1-Tailed	
			Mean	Min	Max	CV%	Critical			MSD	
D-Control	11.429	1.0000	11.4286	4.0000	18.0000	45.985	7				
4	9.556	0.8361	9.5556	4.0000	15.0000	38.134	9	0.998	2.407	4.5174	
5	8.300	0.7263	8.3000	3.0000	15.0000	47.874	10	1.704	2.407	4.4175	
7	9.000	0.7875	9.0000	4.0000	16.0000	48.005	10	1.323	2.407	4.4175	
*9	6.750	0.5906	6.7500	4.0000	10.0000	33.363	8	2.427	2.407	4.6393	
12	8.400	0.7350	8.4000	5.0000	13.0000	27.607	10	1.650	2.407	4.4175	

Auxiliary Tests		Statistic		Critical		Skew		Kurt		
Kolmogorov D Test indicates normal distribution (p > 0.01)		0.55994		1.035		0.18243		-0.6476		
Bartlett's Test indicates equal variances (p = 0.18)		7.58206		15.0863						
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Bonferroni t Test	7	9	7.93725	14.2857	4.41745	0.38653	18.3127	13.8737	0.27162	5, 48

Dose-Response Plot



CHRONIC TEST DATA SHEET

Ceriodaphnia dubia

Project: Trumann Beginning Date: 071612 Time: 1450 Test Species: C. dubia

Dilution H₂O: MH86A Ending Date: 072312 Time: 1440 Age: 424h
MH870

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	X/0	—	—	—	X/0
	2	↓	↓	↓	0	3	6	8	17
	3	↓	↓	↓	↓	4	0	5	9
	4	↓	↓	↓	↓	3	4	8	15
	5	↓	↓	↓	↓	2	6	0	8
	6	↓	↓	↓	X/0	—	—	—	X/0
	7	↓	↓	↓	0	3	6	0	9
	8	↓	↓	↓	0	1	3	0	4
	9	↓	↓	↓	X/0	—	—	—	X/0
	10	↓	↓	↓	4	0	7	7	18
4%	1	0	0	0	3	X/0	—	—	—
	2	↓	↓	↓	0	2	6	0	8
	3	↓	↓	↓	0	4	3	0	7
	4	↓	↓	↓	3	0	6	5	14
	5	↓	↓	↓	4	0	6	5	15
	6	↓	↓	↓	0	1	0	3	4
	7	↓	↓	↓	↓	4	7	0	11
	8	↓	↓	↓	↓	3	5	0	8
	9	↓	↓	↓	↓	0	5	7	12
	10	↓	↓	↓	↓	3	4	0	7
Date		071712	071812	071912	072012	072112	072212	072312	
Initials		UNG	UNG	UNG	UNG	UNG	TB	TB	

CHRONIC TEST DATA SHEET
Ceriodaphnia dubia

Project: Trumann Beginning Date: 071612 Time: 1450 Test Species: C.dubia

Dilution H₂O: MH869 Ending Date: 072312 Time: 1440 Age: <24h
MH870

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

Conc.	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Neonates
5%	1	0	0	0	0	3	6	6	9
	2	↓	↓	↓	↓	3	6	6	15
	3	↓	↓	↓	↓	3	5	6	14
	4	↓	↓	↓	↓	0	4	3	7
	5	↓	↓	↓	↓	0	0	3	3
	6	↓	↓	↓	↓	5	4	0	9
	7	↓	↓	↓	↓	4	0	5	9
	8	↓	↓	↓	↓	3	5	0	8
	9	↓	↓	↓	↓	2	4	0	6
	10	↓	↓	↓	↓	0	0	3	3
7%	1	0	0	0	0	2	2	6	4
	2	↓	↓	↓	↓	1	4	0	5
	3	↓	↓	↓	↓	4	5	0	9
	4	↓	↓	↓	↓	3	0	5	13
	5	↓	↓	↓	↓	0	0	5	10
	6	↓	↓	↓	↓	0	0	4	4
	7	↓	↓	↓	↓	4	7	5	16
	8	↓	↓	↓	↓	2	3	0	5
	9	↓	↓	↓	↓	4	4	5	13
	10	↓	↓	↓	↓	5	0	6	11
Date		071712	071812	071912	072012	072112	072212	072312	
Initials		UNG	UNG	UNG	UNG	UNG	TB	TB	

CHRONIC TEST DATA SHEET
Ceriodaphnia dubia

Project: Trumann Beginning Date: 071612 Time: 1430 Test Species: C.dubia

Dilution H₂O: MH869 Ending Date: 072312 Time: 1440 Age: <24h
MH870

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

Conc.	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Neonates
9%	1	0	0	0	0	4	5	2	9
	2	↓	↓	↓	↓	4	3	0	7
	3	↓	↓	↓	↓	3	4	1	8
	4	↓	↓	↓	↓	2	0	2	4
	5	↓	↓	↓	↓	3	4	0	7
	6	↓	↓	↓	↓	1	4	5	10
	7	↓	↓	↓	↓	1	0	3	4
	8	↓	↓	↓	↓	4	0	1	5
	9	↓	↓	↓	↓	X/0	—	—	X/0
	10	↓	↓	↓	↓	X/0	—	—	X/0
12%	1	0	0	0	0	0	0	5	5
	2	↓	↓	↓	↓	4	4	0	8
	3	↓	↓	↓	↓	5	0	6	11
	4	↓	↓	↓	↓	4	5	0	9
	5	↓	↓	↓	↓	3	0	5	8
	6	↓	↓	↓	↓	1	3	4	8
	7	↓	↓	↓	↓	2	4	0	6
	8	↓	↓	↓	↓	3	4	0	7
	9	↓	↓	↓	↓	0	5	8	13
	10	↓	↓	↓	↓	4	5	0	9
Date		071712	071812	071912	072012	072112	072212	072312	
Initials		UNG	UNG	UNG	UNG	UNG	TB	TB	

Initial Water Chemistry for Chronic Tests
Project: Trumann POTW - C. dubia / P. promelas

Test Day		0	1	2	3	4	5	6
Date		07/16/12	07/17/12	07/18/12	07/19/12	07/20/12	07/21/12	07/22/12
H ₂ O Batch #		MH869	MH869	MH869	MH870	MH870	MH870	MH870
Temp. (°C)	Control	23.8 ^{22.8}	22.0	22.1	22.5	23.0	22.5	22.3
	4%	22.8	22.0	22.0	22.6	23.2	22.5	22.3
	5%	22.9	22.0	22.0	22.4	23.1	22.5	22.3
	7%	22.8	22.1	22.0	22.4	23.1	22.5	22.3
	9%	22.8	22.0	22.0	22.5	23.0	22.5	22.3
	12%	22.8	22.1	22.1	22.6	23.0	22.5	22.3
pH	Control	7.70	7.83	7.65	7.84	7.78	7.72	7.70
	4%	7.73	7.88	7.75	7.86	7.83	7.76	7.76
	5%	7.78	7.90	7.75	7.88	7.84	7.77	7.78
	7%	7.82	7.91	7.77	7.88	7.85	7.79	7.78
	9%	7.83	7.94	7.79	7.88	7.86	7.80	7.79
	12%	7.85	7.97	7.81	7.88	7.86	7.84	7.80
DO (mg/L)	Control	8.4	8.2	8.0	8.4	8.4	8.4	8.2
	4%	8.2	8.1	8.2	8.4	7.8	8.5	8.0
	5%	7.7	8.2	7.8	8.1	7.9	8.7	8.0
	7%	7.5	8.4	8.1	8.4	8.5	8.5	7.7
	9%	7.9	8.4	7.7	8.4	8.3	8.6	8.2
	12%	7.9	8.2	7.8	8.1	8.2	8.6	8.3
Cond. (µS/cm)	Control	330	327	330	313	314	312	310
	4%	338	336	336	320	321	323	319
	5%	340	338	339	322	324	324	321
	7%	343	341	343	327	327	326	326
	9%	347	344	348	331	332	331	331
	12%	352	349	354	336	338	337	336
Alk. (mg/L)	Control	62		62		64		
	12%	70		70		140		
Hard (mg/L)	Control	90		90		90		
	12%	100		100		50		
Initials		mg/jmk	mg	mg	mg	mg / CROP	mg	TS mg

Final Water Chemistry for Chronic Tests
Project: Trumann POTW - P. promelas

Test Day:		1	2	3	4	5	6	7
Date:		071712	071812	071912	072012	072112	072212	072312
H ₂ O Batch #:		MH869	MH869	MH869	MH870	MH870	MH870	MH870
Temp. (°C)	Control	23.0	23.5	23.0	23.0	22.5	22.5	23.7
	4%	23.0	23.5	23.0	23.0	22.5	22.5	24.0
	5%	23.0	23.5	23.0	23.0	22.5	22.5	23.9
	7%	23.0	23.5	23.0	23.0	22.5	22.5	24.2
	9%	23.0	23.5	23.0	23.0	22.5	22.5	24.5
	12%	23.0	23.5	23.0	23.0	22.5	22.5	24.7
pH	Control	7.49	7.13	7.28	7.61	7.36	7.31	7.34
	4%	7.55	7.28	7.42	7.64	7.37	7.39	7.44
	5%	7.58	7.28	7.47	7.67	7.46	7.46	7.45
	7%	7.59	7.33	7.43	7.65	7.45	7.41	7.40
	9%	7.60	7.33	7.45	7.66	7.49	7.53	7.47
	12%	7.63	7.43	7.52	7.70	7.48	7.54	7.47
DO (mg/L)	Control	7.9	5.2	8.9	7.5	6.8	7.1	7.3
	4%	8.9	5.5	8.7	7.4	6.4	7.1	7.7
	5%	7.8	5.0	6.4	7.3	6.8	7.0	7.0
	7%	7.9	5.6	5.9	7.4	6.6	7.0	6.9
	9%	7.9	5.2	5.9	7.3	6.6	7.0	7.3
	12%	8.0	6.2	6.3	7.3	6.4	7.1	7.0
Initials		JAR/SML	ARB/BW	ARB	TR/CAR	TR	MG	BW

Final Water Chemistry for Chronic Tests
Project: Trumann POTW - C. dubia

Test Day:		1	2	3	4	5	6	7
Date:		071712	071812	071912	072012	072112	072212	072312
H ₂ O Batch #:		MH969	MH969	MH870	MH870	MH870	MH870	MH870
Temp. (°C)	Control	22.7 22.7	22.2	23.0	23.0	22.5	23.1	23.4
	4%	22.7	22.2	23.0 22.7	23.0	22.5	23.1	23.4
	5%	22.2	22.2	22.9	23.0	22.5	23.2	23.4
	7%	22.5	22.2	23.0	23.0	22.6	23.1	23.4
	9%	22.4	22.2	23.0	23.0	22.5	23.1	23.4
	12%	22.5	22.3	23.0	23.0	22.5	23.1	23.4
pH	Control	7.60	7.65	7.69	7.79	7.65	7.93	7.65
	4%	7.79	7.83	7.85	7.95	7.80	8.04	7.97
	5%	7.85	7.88	7.91	8.05	7.84	8.05	7.89
	7%	7.87	7.93	7.93	8.11	7.85	8.07	7.90
	9%	7.97	8.03	8.05	8.20	8.00	8.13	7.89
	12%	7.93	8.02	8.00	8.16	7.96	8.09	8.24
DO (mg/L)	Control	7.6	7.9	9.2	8.2	8.8	7.8	7.4
	4%	7.8	7.8	9.2	8.1	8.3	8.5	8.4
	5%	9.2	7.5	9.2	8.2	8.2	8.6	8.0
	7%	8.6	8.1	8.4	8.5	8.4	8.9	8.4
	9%	8.8	8.0	8.6	8.2	8.1	9.0	8.5
	12%	8.2	8.4	8.4	8.0	8.4	8.4	9.1
Initials		MG	MG	MG	MG/MK	MG	TR	TR/BW



Ecotoxicology Research Facility

SAMPLE CHECK IN

Sample ID Number: 2012-23A

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: 07/16/12 Sampling Date: 7/15-16/12 Arrival Time: 0940

Field Identification Number: _____ Description: effluent

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

Drop-Off Location: ASU-ERF

Storage While Shipped: cooler w/ice

Analysis Requested: chrome (copper + phosphorus)

Initial Water Chemistry Analysis:

Sample Received by: IMG

Temperature (°C): 5.0 Ice Present upon delivery: YES NO

Date: 07/16/12

Quality Assurance	Initial	Date	Yes	No
Chain of Custody	<u>IMG</u>	<u>07/16/12</u>	<input checked="" type="checkbox"/>	
Refrigerated at 4°C	<u>↓</u>	<u>↓</u>	<input checked="" type="checkbox"/>	
Field Record Received				<input checked="" type="checkbox"/>
Sample Label Affixed Properly	<u>↓</u>	<u>↓</u>	<input checked="" type="checkbox"/>	
Project Leader Informed	<u>↓</u>	<u>↓</u>	<input checked="" type="checkbox"/>	

Comments: _____



Ecotoxicology Research Facility

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 Trumann POTW			Phone: 870-483-6343				Analyses (List Below)						
			Fax: 870-483-6525										
Project # AR0035602			PO #:				Chronic <i>C. dubia</i>	Chronic <i>P. promelas</i>					
Sampler (sign) Scott Holt			Remarks:										
			Contact: Scotty Jones										
Cont.#	Sample ID Number	Location	Sample Date	Sample Time	Sample Type		Matrix						
					Comp	Grab	Aqueous	Soil	Other				
	AR0035602	effluent junction box	7/15/12-7/16/12	8:00^{AM}-8:00^{AM}	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>						
Ice present at delivery? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Initials MG													
Temp 5.0 °C Initials MG													
1. Relinquished By (sign) Scott Holt			Date 7/16/12		Time 8:35^{AM}		1. Received By (sign) Melanie Gulbin			Date 07/16/12		Time 0840	
2. Relinquished By (sign)			Date		Time		2. Received By (sign)			Date		Time	



EcoTox

Ecotoxicology Research Facility

SAMPLE CHECK IN

Sample ID Number: 2012-23B

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: 071912 Sampling Date: 7/17-18/12 Arrival Time: 0945

Field Identification Number: _____ Description: _____

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

Drop-Off Location: ASU-ERF

Storage While Shipped: cooler with

Analysis Requested: chronic Cd, Pb + P promelas

Initial Water Chemistry Analysis:

Sample Received by: LMG

Temperature (°C): 60 Ice Present upon delivery: YES NO

Date: 071912

Quality Assurance	Initial	Date	Yes	No
Chain of Custody	<u>LMG</u>	<u>071912</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Refrigerated at 4°C	<u>↓</u>	<u>↓</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Field Record Received	<u>↓</u>	<u>↓</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sample Label Affixed Properly	<u>↓</u>	<u>↓</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Project Leader Informed	<u>↓</u>	<u>↓</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Comments: _____



Ecotoxicology Research Facility

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 Trumann POTW			Phone: 870-483-6343			Analyses (List Below)															
Project # AR0035602			Fax: 870-483-6525																		
Sampler (sign) Lou Holt			PO #:			<table border="1"> <tr> <td rowspan="2">Chronic <i>C. dubia</i></td> <td rowspan="2">Chronic <i>P. promelas</i></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> </tr> </table>						Chronic <i>C. dubia</i>	Chronic <i>P. promelas</i>								
Chronic <i>C. dubia</i>	Chronic <i>P. promelas</i>																				
Remarks:			Contact: Scotty Jones																		
Cont.#	Sample ID Number	Location	Sample Date	Sample Time	Sample Type		Matrix														
					Comp	Grab	Aqueous	Soil	Other												
	AR0035602	effluent injection box	7/17/12-7/18/12	8:00 ^{AM} -8:00 ^{AM}	✓		✓														
Ice present at delivery? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Initials <u>MG</u>																					
Temp <u>10.0</u> °C <u>MG</u> Initials																					
1. Relinquished By (sign) Lou Holt			Date 7/18/12		Time 8:40 AM		1. Received By (sign) Melanie Griffin			Date 07/18/12		Time 0845									
2. Relinquished By (sign)			Date		Time		2. Received By (sign)			Date		Time									



Ecotoxicology Research Facility

SAMPLE CHECK IN

Sample ID Number: 2012-23C

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: 072012 Sampling Date: 7/19-20/12 Arrival Time: 0840

Field Identification Number: _____ Description: effluent

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

Drop-Off Location: ASU-ERF

Storage While Shipped: cooler w/ ice

Analysis Requested: chronic Cdubria + P. promelas

Initial Water Chemistry Analysis:

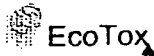
Sample Received by: MG

Temperature (°C): 2.0 Ice Present upon delivery: YES NO

Date: 072012

Quality Assurance	Initial	Date	Yes	No
Chain of Custody	<u>MG</u>	<u>072012</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Refrigerated at 4°C	<u>↓</u>	<u>↓</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Field Record Received	<u>↓</u>	<u>↓</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sample Label Affixed Properly	<u>↓</u>	<u>↓</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Project Leader Informed	<u>↓</u>	<u>↓</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Comments: _____



Ecotoxicology Research Facility

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 Trumann POTW			Phone: 870-483-6343				Analyses (List Below)									
Project # AR0035602			Fax: 870-483-6525													
Sampler (sign) Scott Holt			PO #:				<table border="1"> <tr> <td rowspan="2">Chronic C. dubia</td> <td rowspan="2">Chronic P. promelas</td> <td></td> <td></td> </tr> <tr> <td></td> <td></td> </tr> </table>				Chronic C. dubia	Chronic P. promelas				
Chronic C. dubia	Chronic P. promelas															
Remarks:			Contact: Scotty Jones													
Cont.#	Sample ID Number	Location	Sample Date	Sample Time	Sample Type		Matrix									
					Comp	Grab	Aqueous	Soil	Other							
	AR0035602	effluent junction box	7/19/12-7/20/12	8:00 ^{AM} -8:00 ^{AM}	✓		✓									
Ice present at delivery? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Initials MG																
Temp 20 °C Initials MG																
1. Relinquished By (sign) Scott Holt			Date 7/20/12		Time 8:40^{AM}		1. Received By (sign) Melanie Griffin			Date 072012 0840						
2. Relinquished By (sign)			Date		Time		2. Received By (sign)			Date						



Ecotoxicology Research Facility



ARKANSAS STATE
UNIVERSITY

P.O. Box 647
State University, AR 72467
Tel. 870-972-2570
Fax 870-972-2577
<http://ecotox.astate.edu/>

College of Sciences & Mathematics
www.astate.edu

October 1, 2012

Scotty Jones
Trumann POTW
106 Main Street
Trumann, AR 72472

Dear Scotty,

Please find enclosed the results of the 7-day chronic tests using water collected from your plant facilities during the weeks of September 15, 2012. Effluent dilutions exposed to *Ceriodaphnia dubia* resulted in significant lethality at the 12% dilution and sublethal effects at the 9% and 12% dilutions. All test conditions and acceptability criteria as suggested by our laboratory and the US EPA were met during these tests.

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

Sincerely,

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

Arkansas State University Ecotoxicology Facility

Laboratory Report

Facility Director / Contact: Jennifer L. Bouldin, PhD
Phone: (870) 972-2570

Client: City of Trumann
106 East Main Street
Trumann, AR 72472

Contact: Scotty Jones
(870) 483-6343

NPDES Permit #: AR0035602

AFIN#: 56-00047

Effluent Sampling Point/Type: 24hr Composite

Samples Collected:

Sample #	Sampling Times	Received	Arrival Temp
1	9/16/12 0800 hrs to 9/17/12 0800 hrs	9/17/12 0921 hrs	4.5°C
2	9/18/12 0800 hrs to 9/19/12 0800 hrs	9/19/12 0940 hrs	2.0°C
3	9/20/12 0800 hrs to 9/21/12 0800 hrs	9/21/12 0853 hrs	3.0°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%, 4%, 5%, 7%, 9%, 12%

Critical Dilution: 9%

Statistical Method: Toxcalc 5.0.25


Results:

	<i>C. dubia</i>
NOEC Survival:	9%
Pass/Fail (0=pass; 1=fail):	0
NOEC Growth/Reproduction:	7%
Pass/Fail (0=pass; 1=fail):	1
Control Survival:	100%
Control % CV Growth/Reproduction:	12.2
Critical Dilution % CV Growth/Reproduction:	18.0
Mean Weight/ # Neonates in Control:	24.9
Mean Weight/ # of Neonates in Critical Dilution:	18.1
MSDp Growth/ Reproduction	
Daily Average Minimum NOEC:	9%
7-Day Minimum NOEC:	9%

Results Summary: *C. dubia* exposed to effluent resulted in lethality at the 12% dilution and decreased reproduction at the 9 and 12% dilutions.

QA/Reference Testing: Data attached

Reviewed By:


Jennifer L. Bouldin, Ecotoxicology Research Facility, Director

Toxicity Test Performed: 7-day *Ceriodaphnia dubia* Survival and Reproduction
 Effluent Sampling Point: City of Trumann
 Date Test Started: 09/17/12 *C. dubia*
 Time Test Started: 1110 *C. dubia*
 Date Test Terminated: 09/24/12 *C. dubia*
 Time Test Terminated: 1108 *C. dubia*
 Laboratory Analyst: Griffin

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: 25.6
 Range: 25.4 – 26.0

Light Cycle: 16 hours light/ 8 hours dark
 Light Intensity: 100 footcandles
 Control Water: Moderately Hard Synthetic Water #873/874

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 083012) and yeast/cereal/trout chow mix (#YCT 072412-8) 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: 09/04/12

Terminated: 09/12/12

Time of Reference Toxicant Test

Start: 1545

Terminated: 1505

Laboratory Analyst: Freyaldenhoven

Dilution Water Used: Moderately Hard Synthetic Water #872/873

Results: Survival and Reproduction within control limits

<u>Survival</u>	<u>Reproduction</u>
LOEC: 1.82 g/L NaCl	LOEC: 2.60 g/L NaCl
EC50: 2.02 g/L NaCl	IC25: 1.42 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: City of Trumann – Trumann, AR

NPDES No: AR0035602

		<u>Time</u>	<u>Date</u>		<u>Time</u>	<u>Date</u>
Composite 1:	Collected From	0800	09/16/12	to	0800	09/17/12
Composite 2:	Collected From	0800	09/18/12	to	0800	09/19/12
Composite 3:	Collected From	0800	09/20/12	to	0800	09/21/12

Test Initiated: 1110

Date: 09/17/12

Time Terminated: 1108

Date: 09/24/12

Dilution H₂O: MH 873/874

PERCENT SURVIVAL
Percent Effluent

<u>Time of Reading</u>	<u>0%</u>	<u>4%</u>	<u>5%</u>	<u>7%</u>	<u>9%</u>	<u>12%</u>
24h	100	100	100	100	100	100
48h	100	100	100	100	100	100
7 day	100	100	90	80	90	30

NUMBER OF YOUNG/FEMALE @ 7 DAYS
Percent Effluent

<u>REP</u>	<u>0%</u>	<u>4%</u>	<u>5%</u>	<u>7%</u>	<u>9%</u>	<u>12%</u>
A	29	27	15	17	17	X/16
B	22	18	26	18	18	X/16
C	22	20	24	X/24	X/10	X/13
D	30	23	15	29	17	X/10
E	25	21	19	22	20	X/12
F	25	21	20	25	17	17
G	25	25	13	7	12	13
H	27	23	23	28	22	18
I	21	27	X/5	20	23	X/3
J	23	27	23	X/21	17	X/11
Mean	24.9	23.2	19.8	20.8	18.1	16.0
CV%*	12.2	13.9	23.3	34.2	18.0	16.5

*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 (9%) at 7 days significantly different ($p=0.05$) than the control survival?

 Yes X 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 (9%) significantly different ($p=0.05$) than the control's number of young per female?

 X Yes No

3. If the NOEC for survival is less than the critical dilution, enter [1], otherwise enter [0] for parameter #TGP3B: 0

4. If the NOEC for reproduction is less than the critical dilution, enter [1], otherwise enter [0] for parameter #TLP3B: 1

5. Report the NOEC value for survival, Parameter #TOP3B:
NOEC survival 9 % effluent

6. Report the NOEC value for reproduction, Parameter #TPP3B:
NOEC reproduction 7 % effluent

7. Report the % coefficient of variation (largest of critical and control dilutions), Parameter #TQP3B:
CV % reproduction 18.0 % (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: 9%

2. Report the Whole Effluent Lethality values for the 7-day minimum, Parameter #22414:
7-Day Minimum NOEC: 9%

CHRONIC TOXICITY SUMMARY FORM
WET Testing *Ceriodaphnia dubia* (Cladoceran)
CHEMICAL PARAMETERS CHART

Permittee: City of Trumann

Sample No. 1 Collected

Ending Date: 09/17/12 Time: 0800

NPDES No.: AR0035602

Sample No. 2 Collected

Ending Date: 09/19/12 Time: 0800

Contact: Scotty Jones

Sample No. 3 Collected

Ending Date: 09/21/12 Time: 0800

Analyst: Griffin

Test Begin: Date: 09/17/12 Time: 1110

Test End: Date: 09/24/12 Time: 1108

Initial Water Chemistry for Chronic Tests								
Project: Trumann - <i>C. dubia</i>								
Test day		0	1	2	3	4	5	6
Date		9/17/2012	9/18/2012	9/19/2012	9/20/2012	9/21/2012	9/22/2012	9/23/2012
H ₂ O #		MH 873	MH 873	MH 873	MH 874	MH 874	MH 874	MH 874
Temp (°C)	Control	22.0	22.5	23.5	21.5	23.8	23.5	23.0
	4%	22.0	22.5	23.5	21.0	23.8	23.5	23.0
	5%	22.0	22.5	23.5	21.0	23.9	23.5	23.0
	7%	22.0	22.5	23.5	21.0	23.9	23.5	23.0
	9%	22.0	22.5	23.5	21.0	23.9	23.5	23.0
	12%	22.0	22.5	23.5	21.0	24.0	23.5	23.0
pH (Standard Units)	Control	7.64	7.70	7.67	7.67	7.66	7.74	7.70
	4%	7.81	7.71	7.74	7.79	7.71	7.86	7.87
	5%	7.80	7.74	7.78	7.81	7.75	7.84	7.87
	7%	7.80	7.74	7.79	7.84	7.76	7.86	7.85
	9%	7.80	7.75	7.79	7.86	7.76	7.85	7.86
	12%	7.82	7.77	7.80	7.89	7.78	7.83	7.83
DO (mg/L)	Control	8.1	8.1	6.6	7.8	8.7	7.4	7.9
	4%	7.4	7.8	8.1	8.2	8.3	7.7	7.9
	5%	7.7	7.9	8.0	8.0	7.5	7.9	7.3
	7%	7.6	7.9	7.9	7.7	7.4	7.7	7.4
	9%	7.0	7.2	8.2	8.1	7.9	7.1	7.6
	12%	7.5	7.7	8.1	7.7	7.8	7.6	7.4
Cond (µS/cm)	Control	310	308	312	302	313	314	313
	4%	321	317	325	314	321	321	320
	5%	322	319	327	316	324	325	323
	7%	327	323	332	320	326	329	327
	9%	331	328	335	323	332	333	331
	12%	337	334	341	330	339	340	336
Alk (mg/L)	Control	58		58		60		
	12%	74		62		72		
Hard (mg/L)	Control	100		100		100		
	12%	90		30		100		

CHRONIC TOXICITY SUMMARY FORM
WET Testing *Ceriodaphnia dubia* (Cladoceran)
CHEMICAL PARAMETERS CHART

Permittee: City of Trumann

Sample No. 1 Collected

Ending Date: 09/17/12 Time: 0800

NPDES No.: AR0035602

Sample No. 2 Collected

Ending Date: 09/19/12 Time: 0800

Contact: Scotty Jones

Sample No. 3 Collected

Ending Date: 09/21/12 Time: 0800

Analyst: Griffin

Test Begin: Date: 09/17/12 Time: 1110 Test End: Date: 09/24/12 Time: 1108

Final Water Chemistry for Chronic Tests								
Project: Trumann - <i>C. dubia</i>								
Test day		1	2	3	4	5	6	7
Date:		9/18/2012	9/19/2012	9/20/2012	9/21/2012	9/22/2012	9/23/2012	9/24/2012
H ₂ O #		MH 873	MH 873	MH 874	MH 874	MH 874	MH 874	MH 874
Temp (°C)	Control	22.5	23.5	21.0	24.0	24.0	22.0	23.5
	4%	22.5	23.5	21.0	24.0	24.0	22.0	23.5
	5%	22.5	23.5	21.0	24.0	24.0	22.0	23.5
	7%	22.5	23.5	21.0	24.0	24.0	22.0	23.5
	9%	22.5	23.5	21.0	24.0	24.0	22.0	23.5
	12%	22.5	23.5	21.0	24.0	24.0	22.0	23.5
pH (Standard Units)	Control	7.82	7.78	7.68	7.64	7.65	7.76	7.75
	4%	7.89	7.87	7.80	7.72	7.65	7.88	7.77
	5%	7.94	7.93	7.77	7.77	7.75	7.97	7.79
	7%	7.97	7.91	7.78	7.74	7.55	7.86	7.69
	9%	8.03	8.02	7.88	7.80	7.81	8.09	7.86
	12%	7.97	8.00	7.84	7.80	7.62	8.05	7.80
DO (mg/L)	Control	8.6	8.1	8.4	8.0	7.7	7.8	7.4
	4%	8.5	8.5	8.0	7.9	8.4	8.2	7.5
	5%	8.5	8.6	8.2	7.8	8.3	7.0	7.3
	7%	8.7	8.8	8.8	7.8	8.0	8.3	7.0
	9%	8.5	8.7	8.6	7.7	8.3	8.6	7.5
	12%	8.4	8.9	8.9	7.7	8.1	8.1	7.5

Ceriodaphnia Survival and Reproduction Test-7 Day Survival

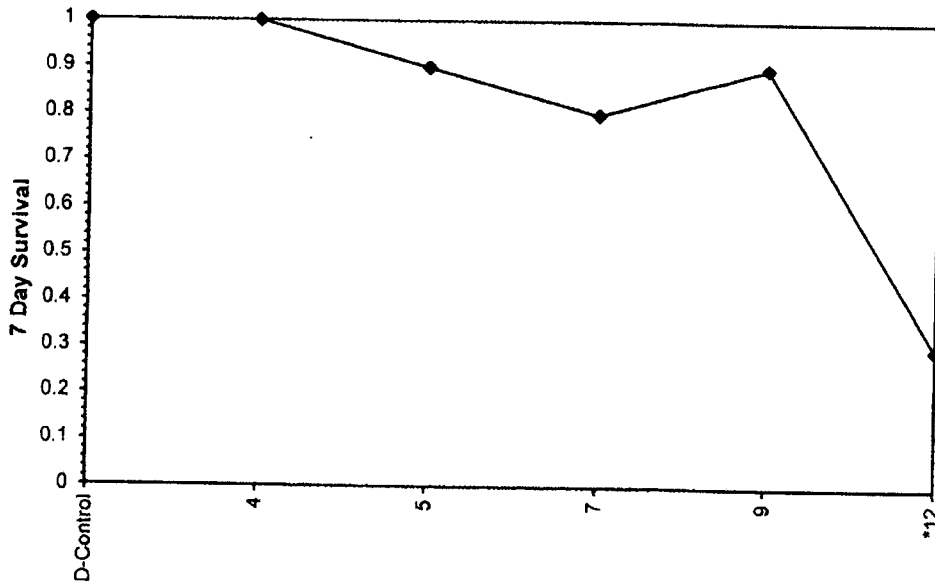
Start Date: 9/17/2012 11:10 Test ID: Sep-12 Sample ID: NPDES Permit #AR0035602
 End Date: 9/24/2012 11:08 Lab ID: ASU ERF Sample Type: EFF1-POTW
 Sample Date: 09/17/12 Protocol: EPAF 02-EPA Freshwater Test Species: CD-Ceriodaphnia dubia
 Comments: 3RD Quarter test

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
4	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
5	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	1.0000
7	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000
9	1.0000	1.0000	0.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000
12	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	0.0000	0.0000

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		
4	1.0000	1.0000	0	10	10	10	1.0000	0.0500
5	0.9000	0.9000	1	9	10	10	0.5000	0.0500
7	0.8000	0.8000	2	8	10	10	0.2368	0.0500
9	0.9000	0.9000	1	9	10	10	0.5000	0.0500
*12	0.3000	0.3000	7	3	10	10	0.0015	0.0500

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Fisher's Exact Test	9	12	10.3923	11.1111

Dose-Response Plot



Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date: 9/17/2012 11:10 Test ID: 12-Sep Sample ID: NPDES Permit #AR0035602
 End Date: 9/24/2012 11:08 Lab ID: ASU ERF Sample Type: EFF1-POTW
 Sample Date: Protocol: EPAF 91-EPA Freshwater Test Species: CD-Ceriodaphnia dubia
 Comments:

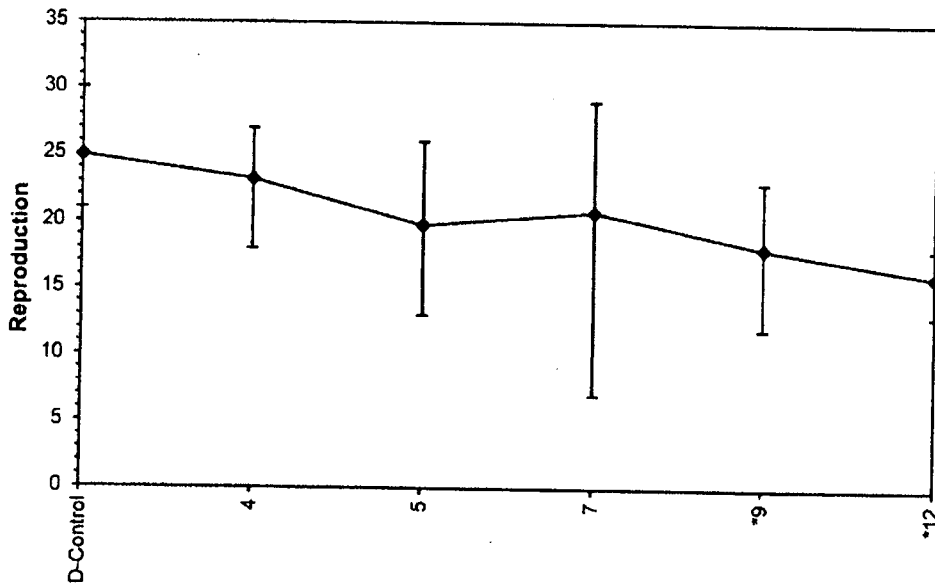
Conc-%	1	2	3	4	5	6	7	8	9	10
D-Control	29.000	22.000	22.000	30.000	25.000	25.000	25.000	27.000	21.000	23.000
4	27.000	18.000	20.000	23.000	21.000	21.000	25.000	23.000	27.000	27.000
5	15.000	26.000	24.000	15.000	19.000	20.000	13.000	23.000	23.000	
7	17.000	18.000	29.000	22.000	25.000	7.000	28.000	20.000		
9	17.000	18.000	17.000	20.000	17.000	12.000	22.000	23.000	17.000	
12	17.000	13.000	18.000							

Conc-%	Mean	N-Mean	Transform: Untransformed					Rank Sum	1-Tailed Critical
			Mean	Min	Max	CV%	N		
D-Control	24.900	1.0000	24.900	21.000	30.000	12.189	10		
4	23.200	0.9317	23.200	18.000	27.000	13.900	10	91.00	74.00
5	19.778	0.7943	19.778	13.000	26.000	23.277	9	63.00	61.00
7	20.750	0.8333	20.750	7.000	29.000	34.150	8	60.00	49.00
*9	18.111	0.7274	18.111	12.000	23.000	17.986	9	50.50	61.00
*12	16.000	0.6426	16.000	13.000	18.000	16.536	3	6.00	7.00

Auxiliary Tests

	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates normal distribution ($p > 0.01$)	0.97248	0.929	-0.57741	1.44244
Bartlett's Test indicates equal variances ($p = 0.10$)	9.15761	15.0863		
Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU
Wilcoxon Rank Sum Test	7	9	7.93725	14.2857

Dose-Response Plot



CHRONIC TEST DATA SHEET
Ceriodaphnia dubia

Project: Trumann Beginning Date: 091712 Time: 1110 Test Species: C. dubia

Dilution H₂O: M4873/874 Ending Date: 092412 Time: 1109 Age: <24h

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	5	0	9	15	29
	2				5	7	0	10	22
	3				3	0	7	12	22
	4				6	10	0	14	30
	5				5	8	0	12	25
	6				5	8	0	12	25
	7				4	8	9 0	13	25
	8				4	0	0	14	27
	9				5	5	0	11	21
	10	∨	∨	∨	4	7	0	12	23
4%	1	0	0	0	5	11	0	11	27
	2				4	8	0	6	18
	3				4	9	0	7	20
	4				5	0	10	8	23
	5				3	8	0	10	21
	6				4	0	9	8	21
	7				5	9	0	11	23 ^{HE}
	8				6	8	1	8	23
	9				6	8	0	13	27
	10	∨	∨	∨	5	1	9	12	27
Date		091812	091912	092012	092112	092212	092312	092412	092412
Initials		LG	MG	JML	MG	MP/MG	HF	MG	MG

CHRONIC TEST DATA SHEET
Ceriodaphnia dubia

Project: Trumann Beginning Date: 091712 Time: 1110 Test Species: C. dubia

Dilution H₂O: MH873/84 Ending Date: 092412 Time: 1108 Age: <24h

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

Conc.	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Neonates
5%	1	0	0	0	3	0	8	4	15
	2	↓	↓	↓	5	1	10	10	24
	3	↓	↓	↓	4	8	0	12	24
	4	↓	↓	↓	2	0	7	6	15
	5	↓	↓	↓	3	0	9	7	19
	6	↓	↓	↓	4	3	7	6	20
	7	↓	↓	↓	0	5	0	8	13
	8	↓	↓	↓	5	9	0	9	23
	9	↓	↓	↓	5	0	0	X/0	X/5
	10	↓	↓	↓	4	0	9	10	23
7%	1	0	0	0	3	0	10	4	17
	2	↓	↓	↓	4	9	0	5	18
	3	↓	↓	↓	6	10	0	X/8	X/24
	4	↓	↓	↓	6	10	1	12	29
	5	↓	↓	↓	5	9	0	8	22
	6	↓	↓	↓	6	9	0	10	25
	7	↓	↓	↓	5	2	0	0	7
	8	↓	↓	↓	4	0	10	14	28
	9	↓	↓	↓	6	7	0	7	20
	10	↓	↓	↓	5	7	3	X/6	X/21
Date		091812	091912	092012	092112	092212	092312	092412	092412
Initials		MG	MG	JMK	MG	HP/MG	HP	MG	MG

CHRONIC TEST DATA SHEET
Ceriodaphnia dubia

Project: Trumann Beginning Date: 091712 Time: 1110 Test Species: C. dubia

Dilution H₂O: MH873/874 Ending Date: 092412 Time: 1108 Age: ~24h

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

Conc.	Rep	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6	Day 7	Neonates
9%	1	0	0	0	4	8	2	3	17
	2	↓	↓	↓	6	6	1	5	18
	3	↓	↓	↓	3	7	0	X/0	X/10
	4	↓	↓	↓	4	5	3	5	17
	5	↓	↓	↓	6	8	2	4	20
	6	↓	↓	↓	5	7	0	5	17
	7	↓	↓	↓	0	0	4	8	12
	8	↓	↓	↓	4	10	0	8	22
	9	↓	↓	↓	5	8	0	10	23
	10	↓	↓	↓	3	0	7	7	17
12%	1	0	0	0	4	8	1	X/3	X/16
	2	↓	↓	↓	3	8	0	X/5	X/16
	3	↓	↓	↓	2	5	0	X/6	X/13
	4	↓	↓	↓	4	6	0	X/0	X/10
	5	↓	↓	↓	4	6	2	X/0	X/12
	6	↓	↓	↓	6	8	0	3	17
	7	↓	↓	↓	5	0	8	0	13
	8	↓	↓	↓	5	8	0	5	18
	9	↓	↓	↓	3	0	0	X/0	X/3
	10	↓	↓	↓	1	0	8	X/2	X/11
Date		091812	091912	092012	092112	092212	092312	092412	092412
Initials		MG	MG	JAC	MG	HT/ MG	HT	MG	MG

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

Test Day:		0	1	2	3	4	5	6
Date:		09/17/12	09/18/12	09/19/12	09/20/12	09/21/12	09/22/12	09/23/12
H ₂ O Batch #:		MH873	MH873	MH873	MH874	MH874	MH874	MH874
Temp. (°C)	Control	22.0	22.5	23.5	21.0 ^{21.5}	23.9	23.5	23.0
	4%	22.0	22.5	23.5	21.0	23.9	23.5	23.0
	5%	22.0	22.5	23.5	21.0	23.9	23.5	23.0
	7%	22.0	22.5	23.5	21.0	23.9	23.5	23.0
	9%	22.0	22.5	23.5	21.0	23.9	23.5	23.0
	12%	22.0	22.5	23.5	21.0	24.0	23.5	23.0
pH	Control	7.69	7.70	7.67	7.67	7.66	7.74	7.70
	4%	7.81	7.71	7.74	7.79	7.71	7.86	7.87
	5%	7.80	7.74	7.78	7.81	7.75	7.84	7.87
	7%	7.80	7.74	7.79	7.84	7.76	7.86	7.85
	9%	7.80	7.75	7.79	7.86	7.76	7.85	7.86
	12%	7.82	7.77	7.80	7.89	7.78	7.83	7.83
DO (mg/L)	Control	8.1	8.1	6.6	7.8	8.7	7.4	7.9
	4%	7.4	7.8	8.1	8.2	8.31	7.7	7.9
	5%	7.7	7.9	8.0	8.0	7.49	7.9	7.3
	7%	7.6	7.9	7.9	7.7	7.42	7.7	7.4
	9%	7.0	7.2	8.2	8.1	7.89	7.1	7.6
	12%	7.5	7.7	8.1	7.7	7.78	7.6	7.4
Cond. (µS/cm)	Control	310	308	312	302	313	314	313
	4%	321	317	325	314	321	321	320
	5%	322	319	327	316	324	325	323
	7%	327	323	332	320	326	329	327
	9%	331	328	335	323	332	333	331
	12%	337	334	340	330	339	340	336
Alk. (mg/L)	Control	58		58	100	60		
	12%	71		62		72		
Hard. (mg/L)	Control	100		100	100	100		
	12%	90		30		100		
Initials		MF MG	MF MG	MF MG	JMC/SV	JMC MG	MF	TB MF

Final Water Chemistry for Chronic Tests
Project: Trumann POTW - *C. dubia*

Test Day:		1	2	3	4	5	6	7
Date:		091812	091912	092012	092112	092212	092312	092412
H ₂ O Batch #:		MH873	MH873	MH874	MH874	MH874	MH874	MH874
Temp. (°C)	Control	22.5	23.5	21.0 ^{21.0}	24.0	24.0	22.0	23.5
	4%	22.5	23.5	21.0	24.0	24.0	22.0	23.5
	5%	22.5	23.5	21.0	24.0	24.0	22.0	23.5
	7%	22.5	23.5	21.0	24.0	24.0	22.0	23.5
	9%	22.5	23.5	21.0	24.0	24.0	22.0	23.5
	12%	22.5	23.5	21.0	24.0	24.0	22.0	23.5
pH	Control	7.82	7.78	7.67 ^{7.67}	7.64	7.65	7.76	7.75
	4%	7.89	7.81	7.80	7.72	7.65	7.88	7.77
	5%	7.94	7.93	7.77	7.71	7.75	7.97	7.79
	7%	7.97	7.91	7.78	7.74	7.55	7.86	7.69
	9%	8.03	8.02	7.88	7.80	7.81	8.09	7.86
	12%	7.97	8.00	7.84	7.80	7.62	8.05	7.90
DO (mg/L)	Control	8.6	8.1	7.8 ^{7.8}	8.0	7.7	7.8	7.4
	4%	8.5	8.5	7.97	7.9	8.4	8.2	7.5
	5%	8.5	8.6	8.22	7.8	8.3	7.0	7.3
	7%	8.7	8.8	8.83	7.8	8.0	8.3	7.0
	9%	8.5	8.7	8.64	7.7	8.3	8.6	7.5
	12%	8.4	8.9	8.88	7.7	8.1	8.1	7.5
Initials		MF	MF	MF	MF MK	MF MF	MF	MF/MG



EcoTox

Ecotoxicology Research Facility

SAMPLE CHECK IN

Sample ID Number: 2012-28A

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: 091712 Sampling Date: 09/16/12-9/17/12 Arrival Time: 0921

Field Identification Number: _____ Description: effluent

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

Drop-Off Location: ASU-ERF

Storage While Shipped: Cooler w/ice

Analysis Requested: Chronic Cdubra

Initial Water Chemistry Analysis:

Sample Received by: MG

Temperature (°C): 4.5 Ice Present upon delivery: YES NO

Date: 091712

Quality Assurance	Initial	Date	Yes	No
Chain of Custody	<u>MG</u>	<u>091712</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Refrigerated at 4°C	<u>↓</u>	<u>↓</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Field Record Received	<u>↓</u>	<u>↓</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sample Label Affixed Properly	<u>↓</u>	<u>↓</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Project Leader Informed	<u>↓</u>	<u>↓</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Comments: _____



EcoTox

Ecotoxicology Research Facility

SAMPLE CHECK IN

Sample ID Number: 28B

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: 09/19/12 Sampling Date: 09/18-19/12 Arrival Time: 0940

Field Identification Number: _____ Description: effluent

Shipped by: Federal Express _____ UPS _____ Hand delivered by: Trumann Personal

Drop-Off Location: ASU-ERF

Storage While Shipped: cooler w/ ice

Analysis Requested: chronic Odebra

Initial Water Chemistry Analysis:

Sample Received by: UMQ

Temperature (°C): 2.0

Ice Present upon delivery: YES NO

Date: 09/19/12

Quality Assurance	Initial	Date	Yes	No
Chain of Custody	<u>UMQ</u>	<u>09/19/12</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Refrigerated at 4°C	<u>↓</u>	<u>↓</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Field Record Received	<u>↓</u>	<u>↓</u>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Sample Label Affixed Properly	<u>↓</u>	<u>↓</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Project Leader Informed	<u>↓</u>	<u>↓</u>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Comments: _____



Ecotoxicology Research Facility

SAMPLE CHECK IN

Sample ID Number: 280

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: 092112 Sampling Date: 092112 Arrival Time: 0853

Field Identification Number: _____ Description: effluent

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

Drop-Off Location: ASU-ERF

Storage While Shipped: cooler w/ ice

Analysis Requested: chronic C. dubia

Initial Water Chemistry Analysis:

Sample Received by: SV

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

Date: 092112

Quality Assurance	Initial	Date	Yes	No
Chain of Custody	SV	092112	✓	
Refrigerated at 4°C	↓	↓	✓	
Field Record Received				✓
Sample Label Affixed Properly	↓	↓	✓	
Project Leader Informed	↓	↓	✓	

Comments: _____



Ecotoxicology Research Facility

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 Trumann POTW			Phone: 870-483-6343			Analyses (List Below)							
Project # AR0035602			Fax: 870-483-6525										
Sampler (sign) <i>Gene Holt</i>			PO #:			<table border="1"> <tr> <td>Chronic C. dubia</td> <td>Chronic P. promelas</td> <td></td> <td></td> </tr> </table>			Chronic C. dubia	Chronic P. promelas			
Chronic C. dubia	Chronic P. promelas												
Remarks:			Contact: Scotty Jones										
Cont.#	Sample ID Number	Location	Sample Date	Sample Time	Sample Type		Matrix						
					Comp	Grab	Aqueous	Soil	Other				
	AR0035602	<i>FINAL Effluent Flume</i>	<i>9/16/12</i>	<i>9/17/12</i>	<i>8:00 AM</i>	<i>8:00 PM</i>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>				
Ice present at delivery? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Initials <i>MG</i>													
Temp <i>4.5°C</i> Initials <i>MG</i>													
1. Relinquished By (sign) <i>Gene Holt</i>			Date <i>9/17/12</i>		Time		1. Received By (sign) <i>Melanie Gilpin</i>			Date <i>091712</i>		Time <i>0921</i>	
2. Relinquished By (sign)			Date		Time		2. Received By (sign)			Date		Time	



Ecotoxicology Research Facility

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Arkansas State University

2645 Caddo Drive

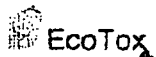
State University, AR 72467

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

CHAIN OF CUSTODY RECORD



Client Name Trumann POTW			Phone: 870-483-6343					Analyses (List Below)							
Project # AR0035602			Fax: 870-483-6525									Chronic C. dubia	Chronic P. promelas		
Sampler (sign) <i>[Signature]</i>			Remarks: Contact: Scotty Jones												
Cont.#	Sample ID Number	Location	Sample Date	Sample Time	Sample Type		Matrix								
					Comp	Grab	Aqueous	Soil	Other						
	AR0035602	Final Effluent	9/18/2012	8:00 AM - 8:00 AM	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>				
Ice present at delivery? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Initials MG															
Temp		20°C Initials MG													
1. Relinquished By (sign) <i>[Signature]</i>			Date 9/19/12	Time 9:39 AM	1. Received By (sign) <i>[Signature]</i>				Date 19 SEP 12	Time 09:40					
2. Relinquished By (sign)			Date	Time	2. Received By (sign)				Date	Time					



Ecotoxicology Research Facility

Ecotoxicology Research Facility

Arkansas State University

2645 Caddo Drive

State University, AR 72467

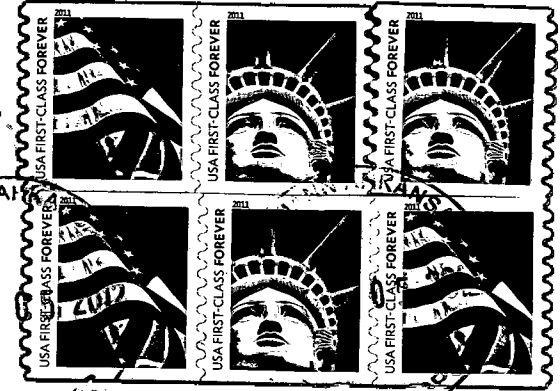
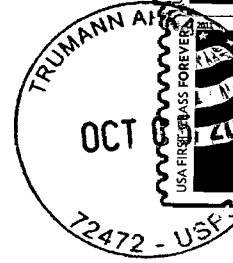
(870) 972-2570 Fax (870) 972-2577

CHAIN OF CUSTODY RECORD



Client Name Trumann POTW			Phone: 870-483-6343					Analyses (List Below)							
Project # AR0035602			Fax: 870-483-6525									Chronic C. dubia	Chronic P. promelas		
Sampler (sign) <i>[Signature]</i>			Remarks: Contact: Scotty Jones												
Cont.#	Sample ID Number	Location	Sample Date	Sample Time	Sample Type		Matrix								
					Comp	Grab	Aqueous	Soil	Other						
	AR0035602	Final Springtime	9/20/12	8:00^{AM} - 8:20^{AM}	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>				<input checked="" type="checkbox"/>				
Ice present at delivery? Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> Initials SV															
Temp		3.0 °C <input checked="" type="checkbox"/> Initials													
1. Relinquished By (sign) <i>[Signature]</i>			Date 9/21/12		Time 8:54 AM		1. Received By (sign) <i>[Signature]</i>			Date 092112		Time 0853			
2. Relinquished By (sign)			Date		Time		2. Received By (sign)			Date		Time			

TRUMANN WATER WORKS
106 E. MAIN ST.
TRUMANN, AR-72472



AR Dept. of Environmental Quality
NPDES Enforcement Section
5301 Northshore Drive
Little Rock, AR 72118-5317

