ESC
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(800) 767-5859
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May 20, 2014

Ms. Patricia Alicea
TN Dept. of Health - Laboratory Services (Greenbrier STP)
630 Hart Lane
Nashville, TN 37247

Biomonitoring Results
ESC Lab Sciences Identification #: L697040-01,-02,-03

Attached are the results for toxicity test performed: May 6-13, 2014

A summary of the findings is presented below:

Test Species	*Ceriodaphnia dubia*	*Pimephales promelas*
EPA Method No.	EPA Method 1002.0	EPA Method 1000.0
Test Concentrations	6.25%, 12.5%, 25%, 50%, 100%	6.25%, 12.5%, 25%, 50%, 100%
Permit Limit	100%	100%
Test Endpoint	IC25	IC25
Test Result	**> 100%**	**> 100%**
	effluent successfully meets permit requirements for Ceriodaphnia dubia	effluent successfully meets permit requirements for fathead minnows

Next Test Date	**Please contact lab to schedule next test**
Comments	**TN State Lab - Greenbrier STP** **TN0020621**

If you have any questions or comments concerning the enclosed report, please do not hesitate to contact us.

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Aquatic Biology Lab
(615) 758-5858 ext. 9687
(615) 758-5858 ext. 7546

ESC LAB SCIENCES

Acute or Chronic? Chronic
Screen or Definitive? Definitive
Test Date: May 6-13, 2014
Lab Identification #: L697040-01,-02,-03

TOXICITY TEST REPORT SHEET

1). Facility/Discharger: TN Dept. of Health - Laboratory Services (Greenbrier STP)

2). Contact Person: Ms. Patricia Alicea
phone (facility): 615.262.6300 (State Lab)
email 1: Patricia.Alicea@tn.gov

3). Permit # or Project ID: TN0020621

4). Report Address
630 Hart Lane
Nashville, TN 37247

5). Receiving Stream: unnamed trib @ mi 0.5 to Carr Creek @ mi 10.3

6). Laboratory Name: ESC Lab Sciences

7). Laboratory Contact (phone): Shain W. Schmitt, Sr. Aquatic Biologist 615.773.7549

8). Outfall(s) Tested: Final Effluent (Greenbrier STP)

9). Test Species	#1 *Ceriodaphnia dubia*	#2 *Pimephales promelas*
10). Species Age	#1 Neonates, <24-hr	#2 24-36 hours old
11). Test Conditions (Static or Static-Renewal?)	#1 Static-Renewal	#2 Static-Renewal

12). Dilution Water Type (synthetic, receiving stream): 20% dilute mineral water

13). Aeration? (Before/During Test): none

14). Dechlorination?: none

15). Original Chlorine Level: <0.2 mg/L, <0.2 mg/L, <0.2 mg/L

16). Report prepared by: Liana M. Dranes, Sr. Aquatic Biologist

Brandon Etheridge — 6-11-14
signature of person performing initial review — date

Brandon Etheridge — Sr. Biologist
name (typed or printed) — title

S. W. S. — 6-17-14
signature of person performing final review — date

Shain W. Schmitt — Sr. Aquatic Biologist
name (typed or printed) — title

Facility/Discharger: TN Dept. of Health - Laboratory Services (Greenbrier STP)
Lab Identification #: L697040-01,-02,-03
Test Date: May 6-13, 2014

SAMPLING SUMMARY

Sample	Sample Type Grab or Composite	Volume Collected	Sample Collection Begin (MM/DD/Time)	Sample Collection End (MM/DD/Time)	Flow Rate (at collection)	Sample Temperature (when received at lab)
1	composite	2 gallons		5/5/2014 @ 08:30		2.4 deg C
2	composite	2 gallons		5/7/2014 @ 08:25		3.1 deg C
3	composite	3 gallons		5/9/2014 @ 08:25		3.0 deg C

Comments: **Location: Greenbrier, TN**

TEST PERFORMANCE

Species #1

***Ceriodaphnia dubia* (water flea)**

5/6/2014 @ 13:57 to 5/12/2014 @ 13:38

Species Age
< 24 hrs old, within 8 hrs of the same age

Organism Source
ESC Lab Sciences, in-house cultures

Acclimation Procedure
cultured in 20% DMW at 25 deg C

Test Duration
3-Brood

Feeding Regime
0.15 *mL* YCT and 0.15 *mL* algal suspension, daily, upon renewal

Type of Test Chamber
polystyrene cup

Volume of Test Chamber
30 *mL*

Volume of Solution Used Per Test Chamber
20 *mL*

Number of Test Organisms Per Test Chamber
one (1)

Number of Replicates Per Treatment
ten (10)

Species #2

***Pimephales promelas* (fathead minnow)**

5/6/2014 @ 13:41 to 5/13/2014 @ 10:20

Species Age	Hatch Date	ESC Lot #
24-36 hours old	5/5/2014	050514HD

Organism Source
Aquatic Bio Systems - Fort Collins, CO

Acclimation Procedure
acclimated in 20% DMW at 25 deg C for about 2 hrs

Test Duration
7-Day

Feeding Regime
0.15 *mL* - 0.2 *mL* newly hatched brine shrimp nauplii, twice daily

Type of Test Chamber
polypropylene beaker

Volume of Test Chamber
500 *mL*

Volume of Solution Used Per Test Chamber
250 *mL*

Number of Test Organisms Per Test Chamber
ten (10)

Number of Replicates Per Treatment
four (4)

ADDITIONAL TOXICITY TEST INFORMATION

Copies of all bench sheets and statistical calculations and printouts obtained during the test are attached in the Appendix.

Methods/Instrumentation used in chemical analysis:

Dissolved Oxygen: YSI 5000 DO Meter/Probe (serial #01L0435)
pH: Beckman 390pH/Temp/mV/ISE Meter
Conductivity: Thermo Orion Model 150A+
pH/RDO/Conductivity: Thermo Scientific Orion VersaStar (serial #V 02105)
Water Bath: Lindberg/Blue, Model WB1140A-1 (serial #S01M-580360-SM)
Temperature: Thermometers calibrated to NIST certified thermometer
Alkalinity: Lachat
Hardness: Lachat
Total Residual Chlorine: Hach Pocket Colorimeter, Model #46770-00 (serial #971000112186)
Environmental Chambers: 25 degrees C + 1.0 degree - Thermo-Kool
Environmental Chambers (for Colorado tests): 20 degrees C $\pm$ 1.0 degree - Thermo Scientific Model 3759
Light Quality: Ambient Lab Illumination
Light Intensity: 50-100 ft-c - SPER Scientific Light Meter 840021/Universal Enterprises Model DLM2
Photoperiod: 16 hours light, 8 hours dark
Drying: Overnight at greater than 60 degrees Celsius in a Fisher Scientific Isotemp Oven, Model 655F
Mean Dry Weight: Determined using Mettler Toledo Balance, AT261 Delta Range
Reference Weights (Set #1): Class 1, TREOMNER, Inc., serial number 85035
Reference Weights (Set #2): Class 1, TREOMNER, Inc., serial number 67812
EPA Acute Manual Edition and Date: EPA-821-02-012 October 2002, Fifth Edition
EPA Chronic Manual Edition and Date: EPA-821-R-02-013 October 2002, Fourth Edition

This method is performed only by Assistant Biologists, Biologists, and Senior Biologists that have experience with aquatic toxicity testing. Laboratory Technicians, Chemists, and any other laboratory personnel that are not experienced with toxicity testing will not handle test organisms during a toxicity evaluation. Lab Techs, Chemists, and others may assist (under supervision) with the gathering of data during the evaluation (pH, DO, conductivity, alkalinity, hardness, etc.), but will not be allowed to do any work with the test organisms themselves. The following analysts have met Technical Training Qualifications and their initials (in parenthesis) can be found on the bench sheets in this report: **Kasey Raley** (KR); **Brandon Etheridge** (BE); **Shain W. Schmitt** (SWS); **Liana M. Dranes** (LMD); **Will Methvin** (WM); **Bridget Miller** (BBM); **Stacy Kennedy** (SK); **Adam Eakes** (AE); **John Ariazi** (JA)

Indicate below any other relevant information that may aid in the evaluation of this report. Include any deviations from EPA Methodology that were necessary for these tests as well as any sample manipulations which were performed, such as aeration, dechlorination with sodium thiosulfate (etc) and the justification for such manipulations or deviations. Attach additional pages as needed.

<< no deviations to report >>

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Facility/Discharger: TN Dept. of Health - Laboratory Services (Greenbrier STP)
Lab Identification #: L697040-01,-02,-03
Test Date: May 6-13, 2014

Toxicity Test Results

Results of a *Ceriodaphnia* (Genus) *dubia* (Species) 3-Brood, Survival & Reproduction Test (Type/Duration)

Conducted 5/6/2014 to 5/12/2014 Using Effluent from Outfall: Final Effluent (Greenbrier STP)

Test Solution	Percent Surviving (time intervals used - days)								# of Young	
	0	1	2	3	4	5	6	7	Total	Mean
Control	100	100	100	100	100	100	100		361	36.1
6.25% Effluent	100	100	100	100	100	100	100		367	36.7
12.5% Effluent	100	100	100	100	100	100	100		369	36.9
25% Effluent	100	100	100	100	100	100	100		368	36.8
50% Effluent	100	100	100	100	100	100	100		376	37.6
100% Effluent	100	100	100	100	100	100	100		365	36.5

Permit Limit: 100%

IC_{25} Value: > 100% survival > 100% reproduction

Confidence Limits
Upper Limit:
Lower Limit:

Confidence Limits
Upper Limit
Lower Limit

Coefficient of Variance (CV%): 16.5%

Statistical methods used to determine NOEC (if applicable):
NOEC not applicable for this evaluation

Percent Minimum Significant Difference: 22.7%

PMSD = Minimum Significant Difference X 100 / Control Mean (reproduction)

The PMSD describes the variability that occurred within the test. If the PMSD value for a given test is less than or equal to the 90th PMSD (47 for *Ceriodaphnia*), the test's variability measure is within the normal range expected for the test.

INTERPRETATION OF RESULTS

Ceriodaphnia dubia (water flea) - No inhibition was demonstrated. Using Linear Interpolation Method, the IC25 (inhibition concentration causing a 25% reduction in survival or reproduction of the test organisms) is reported as being greater than (>) 100% effluent.

Results of the evaluation indicate there was no toxicity exhibited in the *Ceriodaphnia* test. Permittee successfully meets *Ceriodaphnia* requirements for the period.

ESC LAB SCIENCES

Facility/Discharger: TN Dept. of Health - Laboratory Services (Greenbrier STP)
Lab Identification #: L697040-01,-02,-03
Test Date: May 6-13, 2014

Toxicity Test Results

Results of a *Pimephales* (Genus) *promelas* (Species) 7-day, Survival & Growth Test (Type/Duration)

Conducted 5/6/2014 to 5/13/2014 Using Effluent from Outfall: Final Effluent (Greenbrier STP)

Test Solution	Percent Surviving (time intervals used - days)								Dry Weight (mg)	
	0	1	2	3	4	5	6	7	Total	Mean
Control	100	100	100	100	100	100	100	100	1.2150	0.3037
6.25% Effluent	100	100	100	100	100	100	100	100	1.3370	0.3342
12.5% Effluent	100	100	100	100	100	100	100	100	1.4140	0.3535
25% Effluent	100	100	100	100	100	100	100	100	1.3880	0.3470
50% Effluent	100	100	100	100	100	100	100	100	1.4630	0.3657
100% Effluent	100	100	100	100	100	100	100	100	1.5000	0.3750

Permit Limit: 100%

IC_{25} Value: > 100% survival > 100% growth

Confidence Limits
Upper Limit:
Lower Limit:

Confidence Limits
Upper Limit
Lower Limit

Coefficient of Variance (CV%): 8.8%

Statistical methods used to determine NOEC (if applicable):
NOEC not applicable for this evaluation

Percent Minimum Significant Difference: 15.6%

PMSD = Minimum Significant Difference X 100 / Control Mean (growth)

The PMSD describes the variability that occurred within the test. If the PMSD value for a given test is less than or equal to the 90th PMSD (30 for fathead minnow), the test's variability measure is within the normal range expected for the test.

INTERPRETATION OF RESULTS

Pimephales promelas (fathead minnow) - No inhibition was demonstrated. Using Linear Interpolation Method, the IC25 (inhibition concentration causing a 25% reduction in survival or growth of the test organisms) is reported as being greater than (>) 100% effluent.

Results of the evaluation indicate there was no toxicity exhibited in the fathead minnow test. Permittee successfully meets fathead minnow requirements for the period.

APPENDIX

TN State Lab - Greenbrier STP

NPDES #: TN0020621 **Test Date:** May 6-13, 2014

Lab ID #: L697040-01,-02,-03

Comments: Control #2

Tue 5/6/14

Initials	pH	Cond	DO	Time	Analyst
Control	8.2	193.3	8.4	13:42:09	JA
Dup. Control	8.2	192.9	8.4	13:42:28	JA
6.25	8.1	212.8	8.4	13:42:53	JA
Dup. 6.25	8.1	212.2	8.3	13:43:44	JA
12.5	8.1	234.3	8.2	13:44:14	JA
Dup. 12.5	8.1	234.1	8.2	13:44:41	JA
25	8	288.2	8.2	13:45:20	JA
Dup. 25	8	287.8	8.2	13:45:38	JA
50	7.9	394	8.2	13:46:04	JA
Dup. 50	7.9	393	8.2	13:46:29	JA
100 (PL)	7.7	578	8.1	13:47:27	JA
Dup. 100 (PL)	7.7	579	8.1	13:47:43	JA

Wed 5/7/14

Initials	pH	Cond	DO	Time	Analyst
Control	8.2	185.1	8.6	11:44:41	JA
6.25	8.1	196	8.4	11:45:13	JA
12.5	8.1	217	8.4	11:45:37	JA
25	8	275.3	8.3	11:45:58	JA
50	7.9	375	8.2	11:46:21	JA
100 (PL)	7.8	574	8	11:46:53	JA

	Ceriodaphnia dubia				*Pimephales promelas*			
Finals	pH	DO	Time	Analyst	pH	DO	Time	Analyst
Control	8.3	8.3	13:36:54	JA	8.1	8.1	10:19:03	JA
Dup. Control	8.3	8.5	13:37:15	JA	8.1	8	10:19:21	JA
6.25	8.3	8.5	13:37:41	JA	8.1	8.1	10:06:40	JA
Dup. 6.25	8.3	8.6	13:38:04	JA	8.1	8.1	10:07:06	JA
12.5	8.3	8.6	13:38:36	JA	8.1	8.1	10:07:29	JA
Dup. 12.5	8.3	8.6	13:38:58	JA	8.1	8.1	10:07:48	JA
25	8.3	8.6	13:39:29	JA	8.1	8.1	10:08:12	JA
Dup. 25	8.3	8.6	13:39:56	JA	8.1	8	10:08:44	JA
50	8.3	8.6	13:40:24	JA	8.1	8	10:09:24	JA
Dup. 50	8.3	8.6	13:40:41	JA	8.1	8	10:09:44	JA
100 (PL)	8.3	8.5	13:41:04	JA	8.2	8	10:10:08	JA
Dup. 100 (PL)	8.3	8.4	13:41:23	JA	8.2	8	10:10:25	JA

Thu 5/8/14

Initials	pH	Cond	DO	Time	Analyst
Control	8.1	155.9	8.4	13:57:22	KR
6.25	8.2	185.5	8.7	14:01:37	KR
12.5	8.2	211.3	8.5	14:01:56	KR
25	8.1	276.7	8.5	14:02:16	KR
50	8	383	8.5	14:02:36	KR
100 (PL)	7.9	603	8.7	14:02:59	KR

	Ceriodaphnia dubia				*Pimephales promelas*			
Finals	pH	DO	Time	Analyst	pH	DO	Time	Analyst
Control	8.2	8.3	14:05:47	KR	8	7.7	8:59:12	AE
6.25	8.3	8.5	14:09:01	KR	8.1	8	9:02:30	AE
12.5	8.2	8.5	14:09:20	KR	8	7.8	9:02:56	AE
25	8.2	8.4	14:09:38	KR	8	7.6	9:03:22	AE
50	8.2	8.3	14:10:01	KR	8.1	7.7	9:03:51	AE
100 (PL)	8.2	8.2	14:10:28	KR	8.1	7.7	9:04:43	AE

Fri 5/9/14

Initials	pH	Cond	DO	Time	Analyst
Control	8.1	156.4	8.5	13:53:43	KR
6.25	8.1	184.4	8.5	14:16:32	JA
12.5	8.1	214.9	8.4	14:17:08	JA
25	8	382	8.4	14:17:42	JA
50	8	557	8.4	14:18:08	JA
100 (PL)	7.9	610	8.6	14:18:34	JA

	Ceriodaphnia dubia				*Pimephales promelas*			
Finals	pH	DO	Time	Analyst	pH	DO	Time	Analyst
Control	8.2	8	14:45:16	JA	8	7.6	9:04:54	KR
6.25	8.3	8.3	14:45:44	JA	8.1	7.8	9:08:20	JA
12.5	8.2	8.4	14:46:04	JA	8.1	7.7	9:09:57	JA
25	8.3	8.4	14:46:28	JA	8	7.7	9:10:28	JA
50	8.3	8.4	14:46:52	JA	8	7.7	9:10:49	JA
100 (PL)	8.4	8.3	14:47:26	JA	8.1	7.6	9:11:13	JA

TN State Lab - Greenbrier STP

NPDES #: TN0020621 **Test Date:** May 6-13, 2014

Sat 5/10/14

Initials	pH	Cond	DO	Time	Analyst
Control	8.2	212.6	8.4	11:10:51	JA
6.25	7.6	256.9	8.6	0.4735185	JA
12.5	8	286	8.3	11:23:21	JA
25	8	314	8.4	11:23:43	JA
50	7.9	455	8.4	11:24:04	JA
100 (PL)	7.8	613	8.5	11:24:34	JA

	Ceriodaphnia dubia				*Pimephales promelas*			
Finals	pH	DO	Time	Analyst	pH	DO	Time	Analyst
Control	7.4	8.2	11:56:54	JA	8.1	7.8	7:55:40	KR
6.25	8.2	8.4	11:57:20	JA	8.1	8	8:21:20	KR
12.5	8.2	8.4	11:57:43	JA	8.1	7.8	8:25:14	KR
25	8.3	8.3	11:58:08	JA	8.1	7.8	8:30:26	KR
50	8.3	8.3	11:58:27	JA	8.1	7.7	8:33:12	KR
100 (PL)	8.4	8.3	11:58:51	JA	8.1	7.6	8:45:00	KR

Sun 5/11/14

Initials	pH	Cond	DO	Time	Analyst
Control	8	97.3	8.7	10:00:51	BBM
6.25	8.1	115	9.1	10:06:48	BBM
12.5	8	141.7	8.8	10:07:39	BBM
25	8	389	8.8	10:08:27	BBM
50	8	584	8.9	10:09:33	BBM
100 (PL)	7.9	620	8.9	10:10:11	BBM

	Ceriodaphnia dubia				*Pimephales promelas*			
Finals	pH	DO	Time	Analyst	pH	DO	Time	Analyst
Control	8.3	8.4	13:01:49	BBM	8.1	7.6	8:43:49	BBM
6.25	8.5	8.7	13:40:07	BBM	8.2	8	8:59:09	BBM
12.5	8.4	8.8	13:40:57	BBM	8.1	7.9	8:59:39	BBM
25	8.5	8.6	13:41:25	BBM	8.1	7.7	8:59:58	BBM
50	8.5	8.7	13:42:34	BBM	8.1	7.7	9:00:24	BBM
100 (PL)	8.6	8.8	13:42:57	BBM	8.2	7.6	9:00:48	BBM

Mon 5/12/14

Initials	pH	Cond	DO	Time	Analyst
Control	8.3	149.7	8.8	12:27:24	JA
6.25	8.2	169	8.6	12:28:05	JA
12.5	8.2	189.4	8.5	12:28:28	JA
25	8.1	247.9	8.5	12:28:46	JA
50	8.1	360	8.5	12:29:09	JA
100 (PL)	8	568	8.7	12:29:33	JA

	Ceriodaphnia dubia				*Pimephales promelas*			
Finals	pH	DO	Time	Analyst	pH	DO	Time	Analyst
Control	8	8.3	16:01:48	BBM	8	7.7	8:54:05	BBM
6.25	8.3	8.5	16:04:47	BBM	8.1	7.9	8:58:45	JA
12.5	8.2	8.5	16:05:08	BBM	8	7.9	8:59:26	JA
25	8.3	8.6	16:05:33	BBM	8	7.8	8:59:51	JA
50	8.3	8.6	16:05:55	BBM	8	7.7	9:00:15	JA
100 (PL)	8.5	8.6	16:06:17	BBM	8.1	7.6	9:00:41	JA

Tue 5/13/14

Initials	pH	Cond	DO	Time	Analyst
Control					
6.25					
12.5					0
25					0
50					0
100 (PL)					0

	Ceriodaphnia dubia				*Pimephales promelas*			
Finals	pH	DO	Time	Analyst	pH	DO	Time	Analyst
Control					8	7.5	8:34:02	BBM
6.25					8	7.7	8:39:45	BBM
12.5				0	7.9	7.7	8:40:16	BBM
25				0	7.9	7.3	8:40:52	BBM
50				0	7.9	7.2	8:41:31	BBM
100 (PL)				0	8	7.2	8:42:30	BBM

Initials

	pH		Conductivity		DO	
	range	mean	range	mean	range	mean
Control	8-8.3	8.2	97.3-212.6	167.9	8.4-8.8	8.5
6.25	7.6-8.2	8.1	115-256.9	191.5	8.3-9.1	8.6
12.5	8-8.2	8.1	141.7-286	216.1	8.2-8.8	8.4
25	8-8.1	8.0	247.9-389	307.6	8.2-8.8	8.4
50	7.9-8.1	8.0	360-584	437.6	8.2-8.9	8.4
100 (PL)	7.7-8	7.8	568-620	593.1	8-8.9	8.5

Finals

	Ceriodaphnia dubia				*Pimephales promelas*			
	pH		DO		pH		DO	
	range	mean	range	mean	range	mean	range	mean
Control	7.4-8.3	8.1	8-8.5	8.3	8-8.1	8.1	7.5-8.1	7.8
6.25	8.2-8.5	8.3	8.3-8.7	8.5	8-8.2	8.1	7.7-8.1	8.0
12.5	8.2-8.4	8.3	8.4-8.8	8.5	7.9-8.1	8.1	7.7-8.1	7.9
25	8.2-8.5	8.3	8.3-8.6	8.5	7.9-8.1	8.0	7.3-8.1	7.8
50	8.2-8.5	8.3	8.3-8.7	8.5	7.9-8.1	8.1	7.2-8	7.7
100 (PL)	8.2-8.6	8.4	8.2-8.8	8.4	8-8.2	8.1	7.2-8	7.7

TN State Lab - Greenbrier STP

NPDES # TN0020621 **Test Date:** May 6-13, 2014

Lab ID #: L697040-01,-02,-03

Control #2

L# of Control		Alkalinity (mg/L)	Hardness (mg/L)	Carboy
L697143-01	Tue 5/6/14	85	91	H 05-05
L697742-02	Thu 5/8/14	82	95	H 05-07
L698235-01	Sat 5/10/14	83	92	R 05-09

Control Alkalinity (mg/L)			
range:	82-85	mean:	83.3
Control Hardness (mg/L)			
range:	91-95	mean:	92.7

100% Effluent	Alkalinity (mg/L)	Hardness (mg/L)
Tue 5/6/14	165	200
Thu 5/8/14	166	190
Sat 5/10/14	158	180

Effluent Alkalinity (mg/L)			
range:	158-166	mean:	163.0
Effluent Hardness (mg/L)			
range:	180-200	mean:	190.0

	Total Res. Cl_2 (mg/L)	Analyst
Tue 5/6/14	<0.2	KR
Thu 5/8/14	<0.2	AE
Sat 5/10/14	<0.2	AE

Temperature *Pimephales promelas* (°C)

	Tue 5/6/14	Wed 5/7/14	Thu 5/8/14	Fri 5/9/14	Sat 5/10/14	Sun 5/11/14	Mon 5/12/14	Tue 5/13/14
	Analyst:	Analyst:	Analyst:	Analyst:	Analyst:	Analyst:	Analyst:	Analyst:
	BBM	BE	BE	KR	KR	SK	BE	BE
Control	25.7°C	25.2°C	25.1°C	25.2°C	25.1°C	25.0°C	25.3°C	25.0°C
6.25	25.6°C	25.3°C	25.3°C	25.3°C	25.1°C	25.1°C	25.2°C	25.1°C
12.5	25.6°C	25.3°C	25.3°C	25.2°C	25.2°C	25.1°C	25.2°C	25.1°C
25	25.3°C	25.3°C	25.3°C	25.2°C	25.2°C	25.1°C	25.3°C	25.2°C
50	25.3°C	25.3°C	25.3°C	25.2°C	25.2°C	25.2°C	25.3°C	25.3°C
100 (PL)	25.0°C	25.3°C	25.3°C	25.3°C	25.3°C	25.2°C	25.3°C	25.3°C

Measurement taken in test chambers

Temperature *Ceriodaphnia dubia* (°C)

	Tue 5/6/14	Wed 5/7/14	Thu 5/8/14	Fri 5/9/14	Sat 5/10/14	Sun 5/11/14	Mon 5/12/14	Tue 5/13/14
	Analyst:	Analyst:	Analyst:	Analyst:	Analyst:	Analyst:	Analyst:	Analyst:
	BBM	BE	BE	KR	KR	SK	BE	
Test	25.0°C	25.2°C	25.2°C	25.3°C	25.3°C	25.2°C	25.3°C	

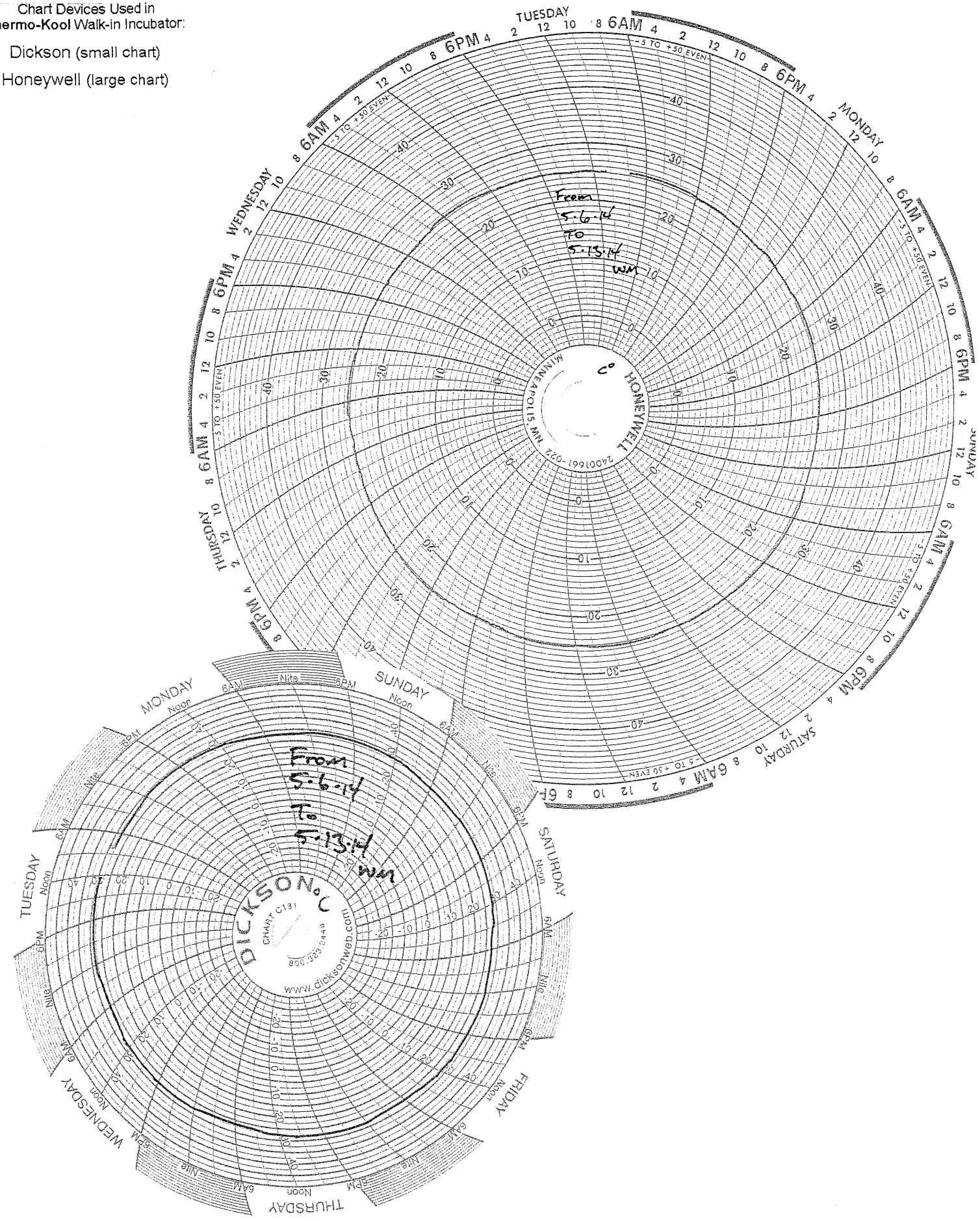
Thermometer serial number: 87870092

TN State Lab - Greenbrier STP

Chart Devices Used in
Thermo-Kool Walk-in Incubator:

Dickson (small chart)

Honeywell (large chart)



NOTATIONS USED BY ANALYSTS DURING TOXICITY EVALUATIONS

Ceriodaphnia dubia (water flea)

#	numbers on the Reproduction bench sheets (chronic) indicate the number of live young produced
@	if number is circled, this indicates movement of daphnid has become impaired either by actual algal growth on the organisms, or has become entrapped in substances found in the effluent sample, or has been covered in stalked cilia
ME	(molted embryo) often a stressed or poor condition female will abort all or some of a brood in response to a toxin, insufficient nutrition, or just an inability to sustain a certain level of reproduction
P	(pale) this is a noticeable reduction in coloration compared to that which is normal for the individual's age
SS	(small size) this observation is made in comparison to other individuals of the same brood or age group and generally represents a difference of at least 2X size difference
ES	(erratic swimming) this represents a locomotor behavior typified by unsustained swimming with the daphnid periodically "resting" on the bottom of the test vessel; this condition is often observed prior to a daphnid becoming totally immotile
I	(immotility) this denotes a total lack of motility; daphnid is on the bottom of the test vessel and is confirmed as living; daphnids are frequently dead within a short time
LIT	(lost in transfer) organism was lost during transfer process; stats are adjusted to represent this dilution as having one less organism
NL	(not loaded) organism was not loaded at test intiation; stats are adjusted to represent this dilution having one less organism
NT	(not transferred) organism was not present at the time of the next transfer; stats are adjusted to represent this dilution having one less organism loaded at the initiation of testing
X	(dead) dead daphnid is on bottom of test vessel and is confirmed dead by observation of no appendage movement and no visible heartbeat

Pimephales promelas (fathead minnow)

#	numbers indicate the number of live organisms remaining
BS	(bent spine) fish appear to have a curved spine
LR	(loss of reflex) fish are alive, but slow to react to gentle prodding
NL	(not loaded) organism was not loaded at test initiation; stats are adjusted to represent this dilution having one less organism
TS	(top swimmers) fish appear to congregate only at the surface of the test solution (sometimes attributed to low dissolved oxygen levels)
SS	(small size) this observation is made in comparison to other individuals of the same age group and generally represents a difference of at least 2X size difference

L #: L697040-01,-02,-03

Date(s) and Time(s) of Neonate Harvest:	From	15:03	on	5/5/2014	to	16:02	on	5/5/2014		
Neonates were Harvested from the Following Tray(s):	050514XA2	050514XA2	050514XA1	050514XA1	042914T2	042914T2	042914T2	042914T2	042914T2	042914AD
Neonates were Harvested from the Following Cups:	E1	F1	F6	H6	C4	C6	J2	J3	J4	C3

Template Name: **Elm**

Control Water Carboy Used ↓

Description of Sample Being Analyzed Below: **CONTROL 2** **TN State Lab - Greenbrier STP** **TN0020621**

Set-up & Transfer Data				Identification of Replicate										# of Offspring at Renewal	# of Live Adults at Renewal
Date	Time	Analyst		A: 1	B: 3	C: 7	D: 3	E: 4	F: 6	G: 1	H: 6	I: 5	J: 3		
H 5-5 Tue 5/6/14	13:57	WM	initiation	0	0	0	0	0	0	0	0	0	0	0	10
H 5-6 Wed 5/7/14	11:10	WM	24 hrs	0	0	0	0	0	0	0	0	0	0	0	10
H 5-7 Thu 5/8/14	13:36	WM	48 hrs	0	0	0	0	0	0	0	0	0	0	0	10
R 5-7 Fri 5/9/14	13:47	SWS	72 hrs	6	5	6	6	5	8	4	5	6	5	56	10
R 5-9 Sat 5/10/14	11:23	KR	96 hrs	0	0	0	0	0	0	0	0	0	0	0	10
H 5-10 Sun 5/11/14	10:05	SK	120 hrs	14	14	13	13	8	15	9	13	11	15	125	10
Mon 5/12/14	13:38	BE	144 hrs	17	18	17	22	19	21	11	22	13	20	180	10
Tue 5/13/14			168 hrs											0	
Wed 5/14/14			192 hrs											0	
Total # of Young Produced:				37	37	36	41	32	44	24	40	30	40	Total Offspring at Renewal: **361**	Total Young Produced: **361**

Test Acceptability Criteria:

Survival ≥ 80%?		≥ 15 neonates/female?		≥ 60% 3rd brood?		Is repro CV < 40%?		Control Valid?	
YES	NO	YES	NO	YES	NO	YES	NO	YES	NO
X		X		X		X		X	

Description of Sample Being Analyzed Below: **6.25** **TN State Lab - Greenbrier STP** **TN0020621**

Set-up & Transfer Data				Identification of Replicate										# of Offspring at Renewal	# of Live Adults at Renewal
Date	Time	Analyst		A: 3	B: 7	C: 5	D: 1	E: 3	F: 1	G: 5	H: 5	I: 6	J: 3		
Tue 5/6/14	13:57	WM	initiation	0	0	0	0	0	0	0	0	0	0	0	10
Wed 5/7/14	11:39	BE	24 hrs	0	0	0	0	0	0	0	0	0	0	0	10
Thu 5/8/14	13:47	WM	48 hrs	0	0	0	0	0	0	0	0	0	0	0	10
Fri 5/9/14	13:55	KR	72 hrs	4	5	7	4	0	5	6	7	6	7	51	10
Sat 5/10/14	11:38	KR	96 hrs	0	0	0	0	0	0	0	0	0	0	0	10
Sun 5/11/14	10:50	SK	120 hrs	13	14	16	0 ME	9	15	14	17	14	12	124	10
Mon 5/12/14	14:17	BE	144 hrs	22	18	19	0	19	22	23	24	24	21	192	10
Tue 5/13/14			168 hrs											0	
Wed 5/14/14			192 hrs											0	
Total # of Young Produced:				39	37	42	4	28	42	43	48	44	40	Total Offspring at Renewal: **367**	Total Young Produced: **367**

Comments:

L #: L697040-01,-02,-03

Description of Sample Being Analyzed Below:				12.5			TN State Lab - Greenbrier STP							TN0020621	
Set-up & Transfer Data				Identification of Replicate										# of Offspring at Renewal	# of Live Adults at Renewal
Date	Time	Analyst		A: 4	B: 2	C: 4	D: 2	E: 6	F: 5	G: 7	H: 3	I: 2	J: 4		
Tue 5/6/14	13:57	WM	initiation	0	0	0	0	0	0	0	0	0	0	0	10
Wed 5/7/14	11:45	BE	24 hrs	0	0	0	0	0	0	0	0	0	0	0	10
Thu 5/8/14	13:49	WM	48 hrs	0	0	0	0	0	0	0	0	0	0	0	10
Fri 5/9/14	13:58	KR	72 hrs	4	5	5	6	0	7	8	6	6	4	51	10
Sat 5/10/14	11:40	KR	96 hrs	0	0	0	0	6	0	0	0	0	0	6	10
Sun 5/11/14	10:55	SK	120 hrs	10	11	13	14	12	15	14	9	12	14	124	10
Mon 5/12/14	14:25	BE	144 hrs	19	18	22	20	0	24	24	15	24	22	188	10
Tue 5/13/14			168 hrs											0	
Wed 5/14/14			192 hrs											0	
Total # of Young Produced:				33	34	40	40	18	46	46	30	42	40	Total Offspring at Renewal	Total Young Produced
														369	369

Description of Sample Being Analyzed Below:				25			TN State Lab - Greenbrier STP							TN0020621	
Set-up & Transfer Data				Identification of Replicate										# of Offspring at Renewal	# of Live Adults at Renewal
Date	Time	Analyst		A: 5	B: 3	C: 7	D: 5	E: 1	F: 6	G: 2	H: 1	I: 4	J: 6		
Tue 5/6/14	13:57	WM	initiation	0	0	0	0	0	0	0	0	0	0	0	10
Wed 5/7/14	11:47	BE	24 hrs	0	0	0	0	0	0	0	0	0	0	0	10
Thu 5/8/14	13:51	WM	48 hrs	0	0	0	0	0	0	0	0	0	0	0	10
Fri 5/9/14	14:00	KR	72 hrs	5	4	5	0	4	6	5	6	5	5	45	10
Sat 5/10/14	11:42	KR	96 hrs	0	0	10	3	0	0	0	0	0	0	13	10
Sun 5/11/14	10:59	SK	120 hrs	12	15	0 SS	10	12	11	15	14	13	15	117	10
Mon 5/12/14	14:27	BE	144 hrs	19	20	10	14	18	22	23	24	23	20	193	10
Tue 5/13/14			168 hrs											0	
Wed 5/14/14			192 hrs											0	
Total # of Young Produced:				36	39	25	27	34	39	43	44	41	40	Total Offspring at Renewal	Total Young Produced
														368	368

"X" = indicates dead daphnid; death is confirmed by observation (no appendage movement and no visible heartbeat)

Comments:

L #: L697040-01,-02,-03

Description of Sample Being Analyzed Below:				50			TN State Lab - Greenbrier STP							TN0020621	
Set-up & Transfer Data				Identification of Replicate										# of Offspring at Renewal	# of Live Adults at Renewal
Date	Time	Analyst		A: 6	B: 4	C: 3	D: 7	E: 5	F: 2	G: 1	H: 4	I: 7	J: 7		
Tue 5/6/14	13:57	WM	initiation	0	0	0	0	0	0	0	0	0	0	0	10
Wed 5/7/14	11:50	BE	24 hrs	0	0	0	0	0	0	0	0	0	0	0	10
Thu 5/8/14	13:53	WM	48 hrs	0	0	0	0	0	0	0	0	0	0	0	10
Fri 5/9/14	14:03	KR	72 hrs	6	5	5	2	5	7	6	4	6	5	51	10
Sat 5/10/14	11:44	KR	96 hrs	0	0	0	0	0	0	0	0	0	0	0	10
Sun 5/11/14	11:03	SK	120 hrs	13	13	10	11	13	15	15	14	15	14	133	10
Mon 5/12/14	14:29	BE	144 hrs	21	21	15	13	22	20	19	21	22	18	192	10
Tue 5/13/14			168 hrs											0	
Wed 5/14/14			192 hrs											0	
Total # of Young Produced:				40	39	30	26	40	42	40	39	43	37	Total Offspring at Renewal	Total Young Produced
														376	376

Description of Sample Being Analyzed Below:				100 (PL)			TN State Lab - Greenbrier STP							TN0020621	
Set-up & Transfer Data				Identification of Replicate										# of Offspring at Renewal	# of Live Adults at Renewal
Date	Time	Analyst		A: 7	B: 5	C: 1	D: 4	E: 7	F: 3	G: 4	H: 6	I: 1	J: 2		
Tue 5/6/14	13:57	WM	initiation	0	0	0	0	0	0	0	0	0	0	0	10
Wed 5/7/14	11:53	BE	24 hrs	0	0	0	0	0	0	0	0	0	0	0	10
Thu 5/8/14	13:55	WM	48 hrs	0	0	0	0	0	0	0	0	0	0	0	10
Fri 5/9/14	14:05	KR	72 hrs	3	4	4	4	4	5	5	4	6	6	45	10
Sat 5/10/14	11:46	KR	96 hrs	0	0	9	0	0	0	0	0	0	0	9	10
Sun 5/11/14	11:07	SK	120 hrs	12	11	0	6	12	14	16	12	16	16	115	10
Mon 5/12/14	14:32	BE	144 hrs	14	16	22	17	18	25	27	18	19	20	196	10
Tue 5/13/14			168 hrs											0	
Wed 5/14/14			192 hrs											0	
Total # of Young Produced:				29	31	35	27	34	44	48	34	41	42	Total Offspring at Renewal	Total Young Produced
														365	365

"X" = indicates dead daphnid; death is confirmed by observation (no appendage movement and no visible heartbeat)

Comments:

Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	5/6/2014	Test ID:	TN0020621	Sample ID:	L697040-01,-02,-03
End Date:	5/12/2014	Lab ID:	ESC Lab Sciences	Sample Type:	EFF1-POTW
Sample Date:		Protocol:	EPAF 94-EPA Freshwater	Test Species:	CD-Ceriodaphnia dubia
Comments:	TN State Lab - Greenbrier STP				

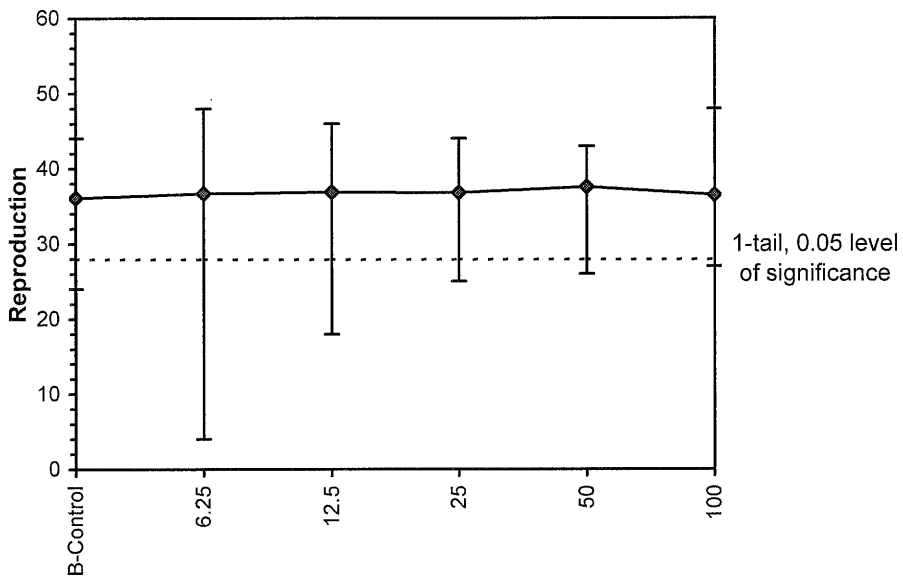
Conc-%	1	2	3	4	5	6	7	8	9	10
B-Control	37.000	37.000	36.000	41.000	32.000	44.000	24.000	40.000	30.000	40.000
6.25	39.000	37.000	42.000	4.000	28.000	42.000	43.000	48.000	44.000	40.000
12.5	33.000	34.000	40.000	40.000	18.000	46.000	46.000	30.000	42.000	40.000
25	36.000	39.000	25.000	27.000	34.000	39.000	43.000	44.000	41.000	40.000
50	40.000	39.000	30.000	26.000	40.000	42.000	40.000	39.000	43.000	37.000
100	29.000	31.000	35.000	27.000	34.000	44.000	48.000	34.000	41.000	42.000

			Transform: Untransformed						1-Tailed	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
B-Control	36.100	1.0000	36.100	24.000	44.000	16.489	10			
6.25	36.700	1.0166	36.700	4.000	48.000	34.443	10	-0.167	2.287	8.198
12.5	36.900	1.0222	36.900	18.000	46.000	23.011	10	-0.223	2.287	8.198
25	36.800	1.0194	36.800	25.000	44.000	17.461	10	-0.195	2.287	8.198
50	37.600	1.0416	37.600	26.000	43.000	14.361	10	-0.418	2.287	8.198
100	36.500	1.0111	36.500	27.000	48.000	18.948	10	-0.112	2.287	8.198

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.15103	1.035	-1.6645	4.62264
Bartlett's Test indicates equal variances (p = 0.09)	9.47031	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs B-Control	100	>100		1	8.19805	0.22709	2.46667	64.2667	0.99915	5, 54

Dose-Response Plot



Ceriodaphnia Survival and Reproduction Test-Reproduction

Start Date:	5/6/2014	Test ID:	TN0020621	Sample ID:	L697040-01,-02,-03
End Date:	5/12/2014	Lab ID:	ESC Lab Sciences	Sample Type:	EFF1-POTW
Sample Date:		Protocol:	EPAF 94-EPA Freshwater	Test Species:	CD-Ceriodaphnia dubia
Comments:	TN State Lab - Greenbrier STP				

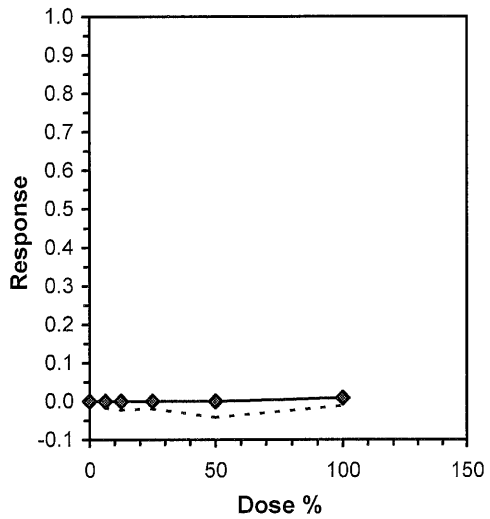
Conc-%	1	2	3	4	5	6	7	8	9	10
B-Control	37.000	37.000	36.000	41.000	32.000	44.000	24.000	40.000	30.000	40.000
6.25	39.000	37.000	42.000	4.000	28.000	42.000	43.000	48.000	44.000	40.000
12.5	33.000	34.000	40.000	40.000	18.000	46.000	46.000	30.000	42.000	40.000
25	36.000	39.000	25.000	27.000	34.000	39.000	43.000	44.000	41.000	40.000
50	40.000	39.000	30.000	26.000	40.000	42.000	40.000	39.000	43.000	37.000
100	29.000	31.000	35.000	27.000	34.000	44.000	48.000	34.000	41.000	42.000

			Transform: Untransformed					Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Mean	N-Mean
B-Control	36.100	1.0000	36.100	24.000	44.000	16.489	10	36.820	1.0000
6.25	36.700	1.0166	36.700	4.000	48.000	34.443	10	36.820	1.0000
12.5	36.900	1.0222	36.900	18.000	46.000	23.011	10	36.820	1.0000
25	36.800	1.0194	36.800	25.000	44.000	17.461	10	36.820	1.0000
50	37.600	1.0416	37.600	26.000	43.000	14.361	10	36.820	1.0000
100	36.500	1.0111	36.500	27.000	48.000	18.948	10	36.500	0.9913

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Kolmogorov D Test indicates non-normal distribution (p <= 0.01)	1.15103	1.035	-1.6645	4.62264
Bartlett's Test indicates equal variances (p = 0.09)	9.47031	15.0863		

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL	Skew
IC05	>100			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



TOXICITY TEST DATA SHEET - *Pimephales promelas* (fathead minnow) 7-Day Survival & Weight Data

TN State Lab - Greenbrier STP

Test Date: May 6-13, 2014 **NPDES #:** TN0020621

NUMBER OF SURVIVORS

Sample Distribution		Sample #1 Tues/Wed		Sample #2 Thurs/Fri		Sample #3 Sat/Sun/Mon			
Day of the Week and Date		Tue 5/6/14	Wed 5/7/14	Thu 5/8/14	Fri 5/9/14	Sat 5/10/14	Sun 5/11/14	Mon 5/12/14	Tue 5/13/14
Effluent Conc. In%	ID of Rep.	0 hours	24 hours	48 hours	72 hours	96 hours	120 hours	144 hours	168 hours
Control #2	A: 1	10	10	10	10	10	10	10	10
	B: 6	10	10	10	10	10	10	10	10
	C: 4	10	10	10	10	10	10	10	10
	D: 3	10	10	10	10	10	10	10	10
6.25	A: 2	10	10	10	10	10	10	10	10
	B: 1	10	10	10	10	10	10	10	10
	C: 3	10	10	10	10	10	10	10	10
	D: 6	10	10	10	10	10	10	10	10
12.5	A: 3	10	10	10	10	10	10	10	10
	B: 2	10	10	10	10	10	10	10	10
	C: 1	10	10	10	10	10	10	10	10
	D: 4	10	10	10	10	10	10	10	10
25	A: 4	10	10	10	10	10	10	10	10
	B: 3	10	10	10	10	10	10	10	10
	C: 5	10	10	10	10	10	10	10	10
	D: 2	10	10	10	10	10	10	10	10
50	A: 5	10	10	10	10	10	10	10	10
	B: 4	10	10	10	10	10	10	10	10
	C: 6	10	10	10	10	10	10	10	10
	D: 1	10	10	10	10	10	10	10	10
100 (PL)	A: 6	10	10	10	10	10	10	10	10
	B: 5	10	10	10	10	10	10	10	10
	C: 2	10	10	10	10	10	10	10	10
	D: 3	10	10	10	10	10	10	10	10
Initials of Analyst Checking Survival		BBM	BE	AE/WM	AE/KR	AE/KR	BBM	BBM	KR
Time that Minnows were Examined:		13:41	11:20	13:54	13:53	11:40	10:19	11:12	10:20
Carboy used to dilute sample:		H 5-5	H 5-6	H 5-7	R 5-7	R 5-9	H 5-10	H 5-11	

WEIGHT DATA for SURVIVING MINNOWS

		Weight Empty Boat (mg)	Boat w/ Fish (mg)	Weight of Larvae (mg)	Mean Weight of Larvae (mg)	Total of Mean	Mean per Concentration
Control	A	1034.19	1037.37	3.18	0.318	1.2150	0.3037
	B	1031.96	1034.6	2.64	0.264		
	C	1031.04	1034.23	3.19	0.319		
	D	1036.13	1039.27	3.14	0.314		
6.25	A	1049.53	1052.51	2.98	0.298	1.3370	0.3342
	B	1049.42	1052.79	3.37	0.337		
	C	1048.22	1051.68	3.46	0.346		
	D	1049.03	1052.59	3.56	0.356		
12.5	A	1041.75	1045.66	3.91	0.391	1.4140	0.3535
	B	1039.69	1043.35	3.66	0.366		
	C	1033.65	1036.69	3.04	0.304		
	D	1028.3	1031.83	3.53	0.353		
25	A	1032.02	1035.53	3.51	0.351	1.3880	0.3470
	B	1043.01	1046.45	3.44	0.344		
	C	1051.19	1054.42	3.23	0.323		
	D	1049.37	1053.07	3.7	0.37		
50	A	1047.89	1051.67	3.78	0.378	1.4630	0.3657
	B	1041.94	1045.64	3.7	0.37		
	C	1039.24	1042.62	3.38	0.338		
	D	1032.39	1036.16	3.77	0.377		
100 (PL)	A	1034.95	1038.91	3.96	0.396	1.5000	0.3750
	B	1036.26	1040.2	3.94	0.394		
	C	1046.85	1050.08	3.23	0.323		
	D	1056.8	1060.67	3.87	0.387		
Analyst:		KR	KR				

Date & Time Put in Oven	Date & Time Removed
05/13/14 @ 10:20	05/14/14 @ 10:22

Oven Temp:	73°C	Oven Temp:	74°C
Analyst:	KR	Analyst:	KR

COMMENTS: Minnows used in this test are from ESC Lot# **050514HD** Minnows were hatched on **5/5/2014**

Survival ≥ 80%?		≥ 0.25mg Average Weight in Surviving Controls?		Is (growth) CV < 40%?		Control Valid?	
YES	NO	YES	NO	YES	NO	YES	NO
X		X		X		X	

Login #: L697040-01,-02,-03

Larval Fish Growth and Survival Test-7 Day Biomass

Start Date:	5/6/2014	Test ID:	TN0020621	Sample ID:	L697040-01,-02,-03
End Date:	5/13/2014	Lab ID:	ESC Lab Sciences	Sample Type:	EFF1-POTW
Sample Date:		Protocol:	EPAF 94-EPA Freshwater	Test Species:	PP-Pimephales promelas
Comments:	TN State Lab - Greenbrier STP				

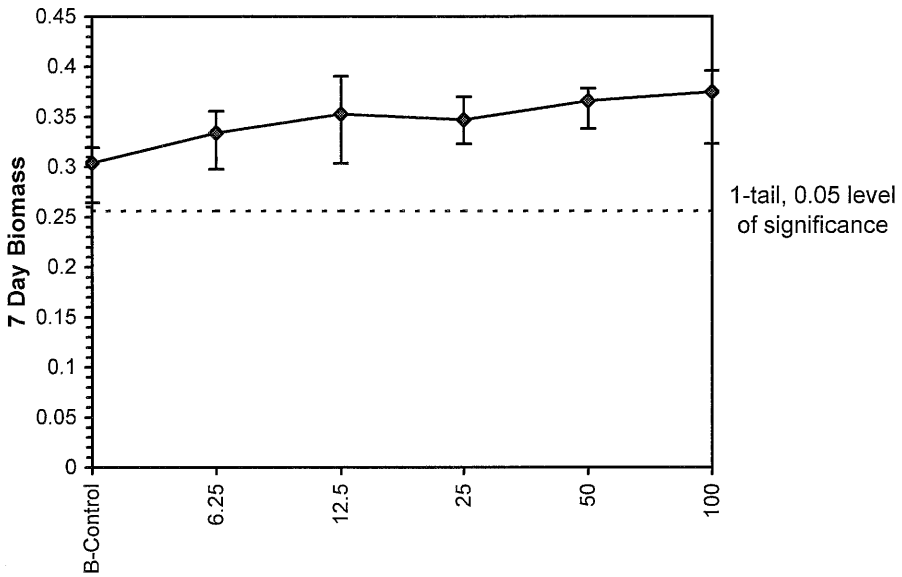
Conc-%	1	2	3	4
B-Control	0.3180	0.2640	0.3190	0.3140
6.25	0.2980	0.3370	0.3460	0.3560
12.5	0.3910	0.3660	0.3040	0.3530
25	0.3510	0.3440	0.3230	0.3700
50	0.3780	0.3700	0.3380	0.3770
100	0.3960	0.3940	0.3230	0.3870

			Transform: Untransformed					1-Tailed		
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	t-Stat	Critical	MSD
B-Control	0.3037	1.0000	0.3037	0.2640	0.3190	8.753	4			
6.25	0.3342	1.1004	0.3342	0.2980	0.3560	7.594	4	-1.552	2.410	0.0474
12.5	0.3535	1.1638	0.3535	0.3040	0.3910	10.346	4	-2.531	2.410	0.0474
25	0.3470	1.1424	0.3470	0.3230	0.3700	5.593	4	-2.200	2.410	0.0474
50	0.3657	1.2041	0.3657	0.3380	0.3780	5.151	4	-3.154	2.410	0.0474
100	0.3750	1.2346	0.3750	0.3230	0.3960	9.302	4	-3.625	2.410	0.0474

Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.86813	0.884	-0.9566	-0.1198
Bartlett's Test indicates equal variances (p = 0.84)	2.03348	15.0863		

Hypothesis Test (1-tail, 0.05)	NOEC	LOEC	ChV	TU	MSDu	MSDp	MSB	MSE	F-Prob	df
Dunnett's Test Treatments vs B-Control	100	>100		1	0.04737	0.15597	0.00257	0.00077	0.0267	5, 18

Dose-Response Plot



Larval Fish Growth and Survival Test-7 Day Biomass

Start Date:	5/6/2014	Test ID:	TN0020621	Sample ID:	L697040-01,-02,-03
End Date:	5/13/2014	Lab ID:	ESC Lab Sciences	Sample Type:	EFF1-POTW
Sample Date:		Protocol:	EPAF 94-EPA Freshwater	Test Species:	PP-Pimephales promelas
Comments:	TN State Lab - Greenbrier STP				

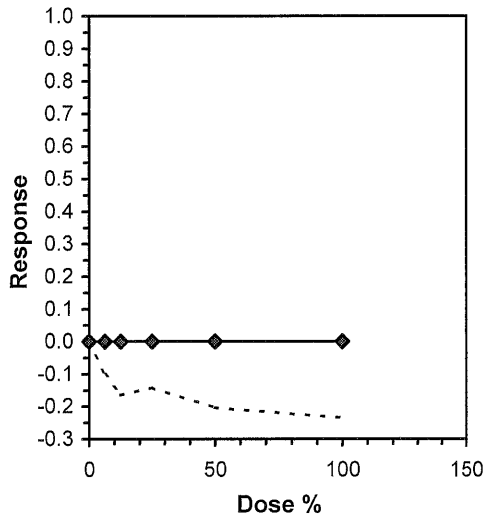
Conc-%	1	2	3	4
B-Control	0.3180	0.2640	0.3190	0.3140
6.25	0.2980	0.3370	0.3460	0.3560
12.5	0.3910	0.3660	0.3040	0.3530
25	0.3510	0.3440	0.3230	0.3700
50	0.3780	0.3700	0.3380	0.3770
100	0.3960	0.3940	0.3230	0.3870

			Transform: Untransformed					Isotonic	
Conc-%	Mean	N-Mean	Mean	Min	Max	CV%	N	Mean	N-Mean
B-Control	0.3037	1.0000	0.3037	0.2640	0.3190	8.753	4	0.3465	1.0000
6.25	0.3342	1.1004	0.3342	0.2980	0.3560	7.594	4	0.3465	1.0000
12.5	0.3535	1.1638	0.3535	0.3040	0.3910	10.346	4	0.3465	1.0000
25	0.3470	1.1424	0.3470	0.3230	0.3700	5.593	4	0.3465	1.0000
50	0.3657	1.2041	0.3657	0.3380	0.3780	5.151	4	0.3465	1.0000
100	0.3750	1.2346	0.3750	0.3230	0.3960	9.302	4	0.3465	1.0000

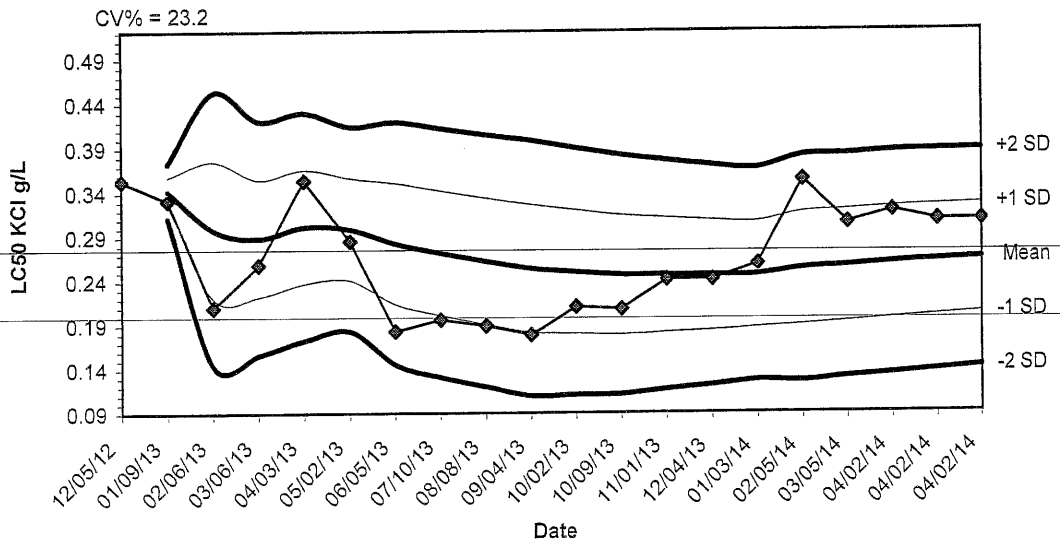
Auxiliary Tests	Statistic	Critical	Skew	Kurt
Shapiro-Wilk's Test indicates non-normal distribution (p <= 0.01)	0.86813	0.884	-0.9566	-0.1198
Bartlett's Test indicates equal variances (p = 0.84)	2.03348	15.0863		

Linear Interpolation (200 Resamples)

Point	%	SD	95% CL(Exp)	Skew
IC05	>100			
IC10	>100			
IC15	>100			
IC20	>100			
IC25	>100			
IC40	>100			
IC50	>100			



Control Chart for April 2014 Acute C.dubia Reference Toxicant



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
12/05/12	0.3536					
01/09/13	0.3318	0.3427	0.3273	0.3119	0.3581	0.3735
02/06/13	0.2102	0.2985	0.2213	0.1440	0.3758	0.4531
03/06/13	0.2588	0.2886	0.2225	0.1563	0.3547	0.4209
04/03/13	0.3536	0.3016	0.2374	0.1731	0.3658	0.4301
05/02/13	0.2856	0.2989	0.2411	0.1833	0.3568	0.4146
06/05/13	0.1833	0.2824	0.2139	0.1453	0.3509	0.4195
07/10/13	0.1961	0.2716	0.2012	0.1308	0.3420	0.4124
08/08/13	0.1895	0.2625	0.1912	0.1199	0.3338	0.4051
09/04/13	0.1789	0.2541	0.1819	0.1096	0.3264	0.3986
10/02/13	0.2108	0.2502	0.1804	0.1106	0.3200	0.3898
10/09/13	0.2082	0.2467	0.1791	0.1115	0.3143	0.3820
11/01/13	0.2415	0.2463	0.1815	0.1168	0.3111	0.3758
12/04/13	0.2415	0.2460	0.1837	0.1215	0.3082	0.3704
01/03/14	0.2588	0.2468	0.1868	0.1267	0.3069	0.3669
02/05/14	0.3536	0.2535	0.1896	0.1257	0.3174	0.3812
03/05/14	0.3055	0.2565	0.1934	0.1303	0.3197	0.3828
04/02/14	0.3186	0.2600	0.1970	0.1341	0.3230	0.3859
04/02/14	0.3078	0.2625	0.2004	0.1382	0.3247	0.3868
04/02/14	0.3078	0.2648	0.2034	0.1421	0.3261	0.3875

ESC
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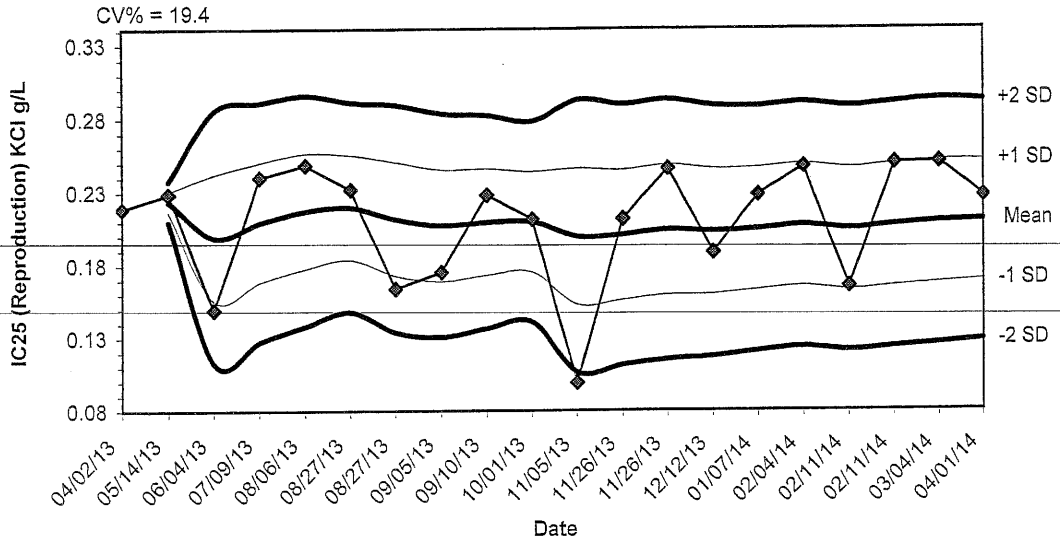
April 2014
Reference Toxicant Test

Control Chart for April 2014 Chronic C.dubia Reference Toxicant



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
04/02/13	0.2190					
05/14/13	0.2289	0.2240	0.2169	0.2099	0.2310	0.2380
06/04/13	0.1496	0.1992	0.1560	0.1127	0.2424	0.2856
07/09/13	0.2404	0.2095	0.1686	0.1277	0.2503	0.2912
08/06/13	0.2486	0.2173	0.1778	0.1383	0.2568	0.2963
08/27/13	0.2320	0.2198	0.1839	0.1481	0.2556	0.2914
08/27/13	0.1640	0.2118	0.1729	0.1340	0.2507	0.2896
09/05/13	0.1753	0.2072	0.1690	0.1307	0.2455	0.2837
09/10/13	0.2282	0.2096	0.1731	0.1366	0.2460	0.2825
10/01/13	0.2114	0.2097	0.1754	0.1410	0.2441	0.2785
11/05/13	0.0993	0.1997	0.1531	0.1065	0.2463	0.2929
11/26/13	0.2117	0.2007	0.1561	0.1115	0.2453	0.2899
11/26/13	0.2461	0.2042	0.1597	0.1152	0.2487	0.2932
12/12/13	0.1887	0.2031	0.1601	0.1172	0.2460	0.2890
01/07/14	0.2281	0.2048	0.1629	0.1210	0.2466	0.2885
02/04/14	0.2474	0.2074	0.1656	0.1237	0.2493	0.2911
02/11/14	0.1654	0.2049	0.1632	0.1214	0.2467	0.2885
02/11/14	0.2498	0.2074	0.1655	0.1237	0.2493	0.2912
03/04/14	0.2502	0.2097	0.1678	0.1259	0.2516	0.2934
04/01/14	0.2270	0.2106	0.1696	0.1287	0.2515	0.2924

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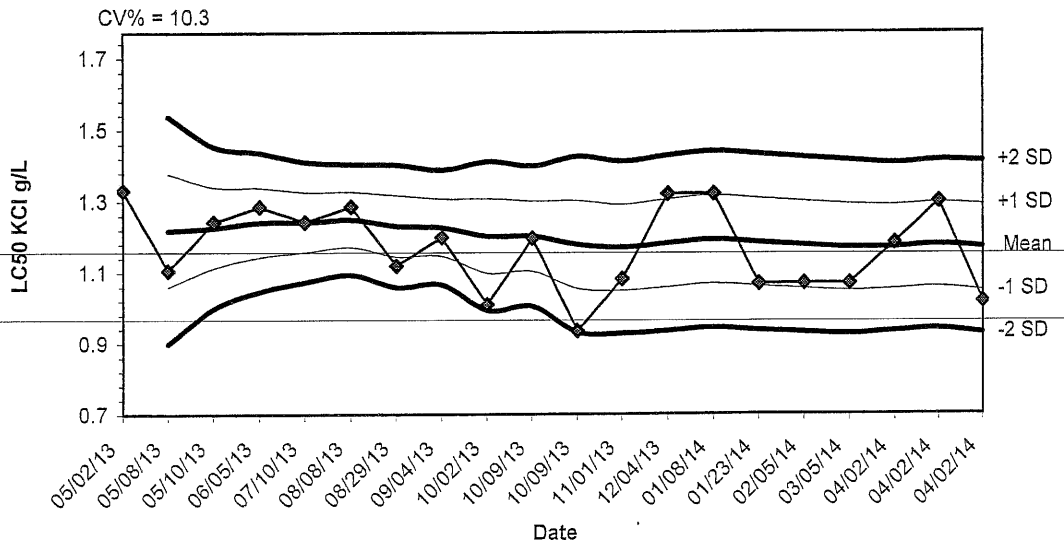
April 2014
Reference Toxicant Test

Control Chart for April 2014 Acute Minnow Reference Toxicant



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
05/02/13	1.3315					
05/08/13	1.1061	1.2188	1.0594	0.9000	1.3782	1.5376
05/10/13	1.2423	1.2266	1.1131	0.9996	1.3401	1.4537
06/05/13	1.2861	1.2415	1.1442	1.0468	1.3388	1.4362
07/10/13	1.2423	1.2417	1.1574	1.0731	1.3260	1.4103
08/08/13	1.2861	1.2491	1.1715	1.0940	1.3266	1.4042
08/29/13	1.1196	1.2306	1.1445	1.0585	1.3166	1.4027
09/04/13	1.2000	1.2268	1.1463	1.0659	1.3072	1.3876
10/02/13	1.0091	1.2026	1.0981	0.9936	1.3071	1.4116
10/09/13	1.1965	1.2020	1.1034	1.0049	1.3005	1.3990
10/09/13	0.9352	1.1777	1.0544	0.9311	1.3010	1.4244
11/01/13	1.0815	1.1697	1.0489	0.9281	1.2905	1.4113
12/04/13	1.3199	1.1812	1.0583	0.9353	1.3042	1.4271
01/08/14	1.3199	1.1912	1.0674	0.9435	1.3150	1.4388
01/23/14	1.0665	1.1828	1.0593	0.9357	1.3064	1.4300
02/05/14	1.0688	1.1757	1.0530	0.9302	1.2984	1.4212
03/05/14	1.0688	1.1694	1.0478	0.9262	1.2911	1.4127
04/02/14	1.1821	1.1701	1.0521	0.9340	1.2882	1.4062
04/02/14	1.2980	1.1769	1.0585	0.9400	1.2953	1.4137
04/02/14	1.0169	1.1689	1.0482	0.9275	1.2895	1.4102

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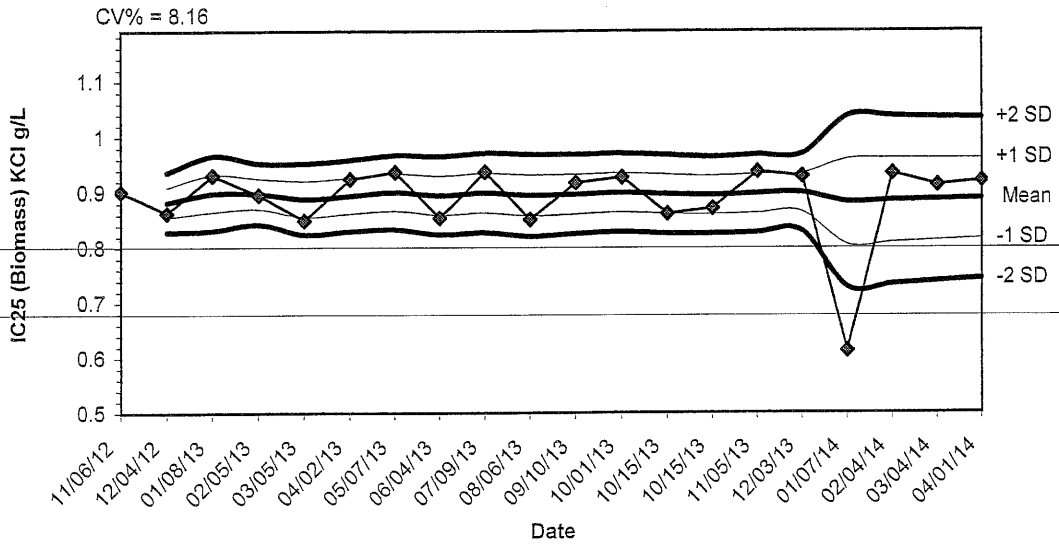
April 2014
Reference Toxicant Test

Control Chart for April 2014 Chronic Minnow Reference Toxicant



Dates	Values	Mean	-1 SD	-2 SD	+1 SD	+2 SD
11/06/12	0.9022					
12/04/12	0.8640	0.8831	0.8561	0.8291	0.9101	0.9371
01/08/13	0.9312	0.8991	0.8654	0.8317	0.9328	0.9665
02/05/13	0.8960	0.8984	0.8708	0.8432	0.9259	0.9535
03/05/13	0.8500	0.8887	0.8565	0.8243	0.9209	0.9531
04/02/13	0.9246	0.8947	0.8623	0.8300	0.9270	0.9593
05/07/13	0.9375	0.9008	0.8671	0.8335	0.9344	0.9681
06/04/13	0.8545	0.8950	0.8598	0.8246	0.9302	0.9654
07/09/13	0.9375	0.8997	0.8639	0.8280	0.9356	0.9714
08/06/13	0.8517	0.8949	0.8579	0.8208	0.9320	0.9690
09/10/13	0.9176	0.8970	0.8612	0.8254	0.9328	0.9686
10/01/13	0.9276	0.8995	0.8643	0.8290	0.9348	0.9701
10/15/13	0.8616	0.8966	0.8613	0.8259	0.9320	0.9673
10/15/13	0.8714	0.8948	0.8602	0.8255	0.9295	0.9641
11/05/13	0.9375	0.8977	0.8625	0.8274	0.9328	0.9680
12/03/13	0.9292	0.8996	0.8648	0.8299	0.9345	0.9694
01/07/14	0.6130	0.8828	0.8055	0.7282	0.9601	1.0373
02/04/14	0.9343	0.8856	0.8097	0.7337	0.9616	1.0375
03/04/14	0.9128	0.8871	0.8130	0.7389	0.9611	1.0352
04/01/14	0.9205	0.8887	0.8163	0.7438	0.9612	1.0337

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April 2014
Reference Toxicant Test

State of TN Laboratory

630 Hart Lane
Nashville, TN 37247

Billing Information:
Accounts Payable
710 James Robertson Pkwy 11th floor
Nashville, TN 37243

Report to: Patricia Alicea

Email To: Patricia.Alicea@tn.gov

Project Description: State Lab - Greenbrier Biomonitoring

City/State Collected:

Phone: 615-262-6300
Fax: 615-262-6393

Client Project #

Lab Project # STATELAB-BIO GREENBR

Collected by (print): Michael Thornton

Site/Facility ID # TN0020621

P.O. #

Collected by (signature):

Immediately Packed on Ice: N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X_Yes
FAX? ___No ___Yes

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	ALKBIO 125mlHDPE-NoPres	Biomonitoring 1 Gal-HDPE-NoPres	HARD 125mlHDPE-HNO3							Rem./Contaminant	Sample # (lab only)
SAMPLE 1	Comp	WW		5-5-14	0830	4	X	X	X								-01

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other

Remarks: Sample #1 - Collect a 24hr composite sample from Sunday-Monday (5/4-5/5). Ship sample overnight to arrive at lab on Tuesday 5/6/2014.

pH ____ Temp ____
Flow ____ Other ____

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Michael Thornton	5-5-14	0850	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
Mekai E. Smith	5-5-14	14:54	
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☒ Courier ☒ CLT

Temp 4.1 °C Bottles Received: 4

Date: 5-5-14 Time: 1454

Hold #

Condition: (lab use only) TP

COC Seal Intact: Y ___ N ___ NA

pH Checked: ___ NCF: ___

Chain of Custody Page ___ of ___

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13065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L # L877046

A077

Acctnum: STATELAB
Template: T93354
Prelogin: P465288
TSR: 530 - Rodney Shinbaum
PB: 4-14 KW

Shipped Via: FedEx Ground

State of TN Laboratory

630 Hart Lane
Nashville, TN 37247

Billing Information:
Accounts Payable
710 James Robertson Pkwy 11th floor
Nashville, TN 37243

Report to: Patricia Alicea

Email To: Patricia.Alicea@tn.gov

Project Description: State Lab - Greenbrier Biomonitoring

City/State Collected:

Phone: 615-262-6300
Fax: 615-262-6393

Client Project #

Lab Project # STATELAB-BIO GREENBR

Collected by (print): Richard R Thornton

Site/Facility ID # TN0020621

P.O. #

Collected by (signature):

Immediately Packed on ice N ____ Y X

Rush? (Lab MUST Be Notified)
____ Same Day 200%
____ Next Day 100%
____ Two Day 50%
____ Three Day 25%

Date Results Needed

Email? ___No X__Yes
FAX? ___No ___Yes

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	ALKBIO 125ml HDPE-NoPres	Biomonitoring 1 Gal-HDPE-NoPres	HARD 125ml HDPE-HNO3	Rem./Contaminants	Sample # (lab only)
SAMPLE 2	Comp	WW		5-7-14	0825	4	X	X	X	L870410	-02

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other_____

Remarks: Sample #2 - Collect a 24hr composite sample from Tuesday-Wed (5/6-5/7). Ship sample to arrive at lab on Thursday 5/8/2014.

pH _____ Temp _____
Flow _____ Other _____

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
	5-7-14	0838	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
	5/7/14	14:47	
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier ☐ CAT
Temp: 3.1 °C Bottles Received: 4
Date: 5-7-14 Time: 1447

Hold #
Condition: (lab use only) OK
COC Seal Intact: ___Y ___N ___NA
pH Checked: 2 NCF:

Chain of Custody Page ___ of ___

ESC LABORATORY SCIENCES
12065 Lebanon Rd
Mount Juliet, TN 37122
Phone: 615-758-5858
Phone: 800-767-5859
Fax: 615-758-5859

L # L870410
E114
Acctnum: STATELAB
Template: T93355
Prelogin: P465289
TSR: 530 - Rodney Shinbaum
PB: 4-14 KLD
Shipped Via: FedEx Ground

State of TN Laboratory

630 Hart Lane
Nashville, TN 37247

Billing Information:
Accounts Payable
710 James Robertson Pkwy 11th floor
Nashville, TN 37243

Report to: Patricia Alicea

Email To: Patricia.Alicea@tn.gov

Project Description: State Lab - Greenbrier Biomonitoring

City/State Collected:

Phone: 615-262-6300
Fax: 615-262-6393

Client Project #

Lab Project # STATELAB-BIO GREENBR

Collected by (print): Michael R Hoyle

Site/Facility ID # TN0020621

P.O. #

Collected by (signature):

Immediately Packed on Ice: N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day 200%
___ Next Day 100%
___ Two Day 50%
___ Three Day 25%

Date Results Needed

Email? ___No X__Yes
FAX? ___No ___Yes

Analysis / Container / Preservative

Sample ID	Comp/Grab	Matrix *	Depth	Date	Time	No. of Cntrs	ALKBIO 125mlHDPE-NoPres	Biomonitoring 1 Gal-HDPE-NoPres	HARD 125mlHDPE-HNO3									Rem./Contaminant	Sample # (lab only)
SAMPLE 3	Comp	WW		5-9-14	0825	5	X	X	X										-03

* Matrix: SS - Soil GW - Groundwater WW - WasteWater DW - Drinking Water OT - Other ___

Remarks: Sample #3 - Collect a 24hr composite sample from Thursday-Friday (5/8-5/9). Ship sample to arrive at lab on Saturday 5/10/2014. **SATURDAY Delivery Must be Marked**

pH ___ Temp ___
Flow ___ Other ___

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
	5-9-14	0840	
Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)
	5.9.14	14:34	
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)

Samples returned via: ☐ UPS ☐ FedEx ☐ Courier

Temp: 3.0 °C Bottles Received: 5

Date: 5.9.14 Time: 1434

Hold #

Condition: (lab use only)

COC Seal Intact: ___Y ___N ___NA

pH Checked: NCF:

Chain of Custody Page ___ of ___

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