

**Appendix 32: Raw Data for 96-hour Toxicity of
Sulfate on *Ligumia recta***

Raw Laboratory Data

96 Hour Water Column Acute Test Data Sheet/ 6 treatments												
Toxicant: Sulfate			Species: <i>Ligumia recta</i>									
Rate: 7.263g N ₂ S ₀₄ / L EPA			50% dilution									
Water: EPA (MARW)-A 9/4/09			Culture: Univ. Missouri State - Barnhart Lab									
Start Date/Time: 9/10/09 3pm			Age: Drop date 9/5/09 ^{5 days old}			Initials: AD						
Temp/Light: 20°C 16:8			Glassware: 50 ml beaker with 40 ml overlying H ₂ O									
Treatment	rep	Survival					Chem	0h	24h	48h	72h	96h
		0h	24h	48h	72h	96h						
A Control	1	S	S	S	S	S	temp	19.8	19.7	19.8	19.2	19.2
	2	S	S	S	S	S	pH	7.9				8.0
	3	S	S	S	S	S	cond	309				308
	4	S	S	S	S	Y	D.O.	7.93				7.85
							Alk	60	x	x	x	62
						Hard	92	x	x	x	92	
B 397	1	S	S	S	S	S	temp	19.8	19.7	19.8	19.2	19.2
	2	S	S	S	S	S	pH	8.0				8.2
	3	S	S	S	S	S	cond	1029				1032
	4	S	S	S	S	S	D.O.	7.95				7.87
							Alk	60	x	x	x	62
						Hard	92	x	x	x	92	
C 703	1	S	S	S	S	S	temp	19.8	19.8	19.9	19.2	19.2
	2	S	S	S	S	S	pH	8.1				8.3
	3	S	S	S	S	S	cond	1691				1716
	4	S	S	S	S	Y	D.O.	7.95				7.92
							Alk	60	x	x	x	60
						Hard	92	x	x	x	92	
D 1317	1	S	S	S	S	S	temp	19.8	19.9	19.9	19.2	19.2
	2	S	S	S	S	S	pH	8.0				8.3
	3	S	S	S	S	3	cond	2840				2990
	4	S	S	S	S	Y	D.O.	7.94				7.96
							Alk	60	x	x	x	60
						Hard	92	x	x	x	92	
E 2545	1	S	S	S	0	0	temp	19.8	19.9	20.0	19.2	19.2
	2	S	S	S	0	0	pH	8.1				8.4
	3	S	S	S	1	0	cond	5280				5380
	4	S	S	S	3	0	D.O.	7.99				7.95
							Alk	60	x	x	x	60
						Hard	92	x	x	x	92	
F 5000	1	S	0	0	0	0	temp	19.9	19.9	20.0	19.2	19.2
	2	S	0	0	0	0	pH	8.1				8.4
	3	S	0	0	0	0	cond	9570				9680
	4	S	0	0	0	0	D.O.	8.08				8.00
							Alk	62	x	x	x	64
						Hard	94	x	x	x	94	
Initials		AD	AD	AD	AD	DS						

nominal 1613 (1433-1815)

Analytical Chemistry Data



Underwriters
Laboratories

LABORATORY REPORT

This report contains 10 pages.
(including the cover page)

If you have any questions concerning this report, please do not hesitate to call us at
(800) 332-4345 or (574) 233-4777.

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Underwriters Laboratories

Laboratory Report

Client: Illinois Natural History Survey
Attn: Amy Dickinson
1910 South Griffith Drive
Champaign, IL 61820

Report: 233654
Priority: Standard Written
Status: Final
PWS ID: Not Supplied

Copies to: None

Sample Information					
UL ID #	Client ID	Method	Collected Date / Time	Collected By:	Received Date / Time
2147409	1A Control	300.0	09/04/09 11:00	Client	09/17/09 09:45
2147410	1B 535ppm NaCl	300.0	09/04/09 11:00	Client	09/17/09 09:45
2147411	1C 1032ppm NaCl	300.0	09/04/09 11:00	Client	09/17/09 09:45
2147412	1D 2028ppm NaCl	300.0	09/04/09 11:00	Client	09/17/09 09:45
2147413	1E 4018ppm NaCl	300.0	09/04/09 11:00	Client	09/17/09 09:45
2147414	1F 8000ppm NaCl	300.0	09/04/09 11:00	Client	09/17/09 09:45
2147415	2A Control	300.0	09/08/09 13:30	Client	09/17/09 09:45
2147416	2B 535ppm NaCl	300.0	09/08/09 13:30	Client	09/17/09 09:45
2147417	2C 1032ppm NaCl	300.0	09/08/09 13:30	Client	09/17/09 09:45
2147418	2D 2028ppm NaCl	300.0	09/08/09 13:30	Client	09/17/09 09:45
2147419	2E 4018ppm NaCl	300.0	09/08/09 13:30	Client	09/17/09 09:45
2147420	2F 8000ppm NaCl	300.0	09/08/09 13:30	Client	09/17/09 09:45
2147421	1A Control	300.0	09/10/09 11:00	Client	09/17/09 09:45
2147422	1B 397ppm Sulfate	300.0	09/10/09 11:00	Client	09/17/09 09:45
2147423	1C 703ppm Sulfate	300.0	09/10/09 11:00	Client	09/17/09 09:45
2147424	1D 1317ppm Sulfate	300.0	09/10/09 11:00	Client	09/17/09 09:45
2147425	1E 2545ppm Sulfate	300.0	09/10/09 11:00	Client	09/17/09 09:45
2147426	1F 5000ppm Sulfate	300.0	09/10/09 11:00	Client	09/17/09 09:45
2147427	2A Control	300.0	09/14/09 13:00	Client	09/17/09 09:45
2147428	2B 397ppm Sulfate	300.0	09/14/09 13:00	Client	09/17/09 09:45
2147429	2C 703ppm Sulfate	300.0	09/14/09 13:00	Client	09/17/09 09:45
2147430	2D 1317ppm Sulfate	300.0	09/14/09 13:00	Client	09/17/09 09:45
2147431	2E 2545ppm Sulfate	300.0	09/14/09 13:00	Client	09/17/09 09:45
2147432	2F 5000ppm Sulfate	300.0	09/14/09 13:00	Client	09/17/09 09:45

Report Summary

Detailed quantitative results are presented on the following pages. The results presented relate only to the samples provided for analysis.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call Kelly Trott at (574) 233-4777.

Note: This report may not be reproduced, except in full, without written approval from Underwriters Laboratories (UL).

Client Name: Illinois Natural History Survey

Report #: 233654

Kelly Lott

Authorized Signature

Project Manager

Title

9/30/2009

Date

Client Name: Illinois Natural History Survey
Report #: 233654

Data for *Musculium transversum* chloride toxicity test

Client Name: Illinois Natural History Survey

Report #: 233654

Sampling Point: 1A Control

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	33	mg/L	---	09/21/09 18:01	2147409
14808-79-8	Sulfate	300.0	250 ^	5.0	58	mg/L	---	09/21/09 18:01	2147409

Sampling Point: 1B 535ppm NaCl

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	490	mg/L	---	09/22/09 12:33	2147410
14808-79-8	Sulfate	300.0	250 ^	5.0	58	mg/L	---	09/21/09 18:29	2147410

Sampling Point: 1C 1032ppm NaCl

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	970	mg/L	---	09/22/09 13:46	2147411
14808-79-8	Sulfate	300.0	250 ^	5.0	59	mg/L	---	09/21/09 19:51	2147411

Sampling Point: 1D 2028ppm NaCl

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	1900	mg/L	---	09/22/09 14:11	2147412
14808-79-8	Sulfate	300.0	250 ^	5.0	58	mg/L	---	09/21/09 21:14	2147412

Sampling Point: 1E 4018ppm NaCl

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	3800	mg/L	---	09/22/09 14:35	2147413
14808-79-8	Sulfate	300.0	250 ^	5.0	58	mg/L	---	09/21/09 21:41	2147413

Data for *Musculium transversum* chloride toxicity test

Client Name: Illinois Natural History Survey

Report #: 233654

Sampling Point: 1F 8000ppm NaCl

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	7700	mg/L	---	09/22/09 15:00	2147414
14808-79-8	Sulfate	300.0	250 ^	5.0	60	mg/L	---	09/21/09 22:09	2147414

Sampling Point: 2A Control

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	39	mg/L	---	09/21/09 22:36	2147415
14808-79-8	Sulfate	300.0	250 ^	5.0	59	mg/L	---	09/21/09 22:36	2147415

Sampling Point: 2B 535ppm NaCl

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	520	mg/L	---	09/22/09 15:24	2147416
14808-79-8	Sulfate	300.0	250 ^	5.0	59	mg/L	---	09/21/09 23:04	2147416

Sampling Point: 2C 1032ppm NaCl

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	1000	mg/L	---	09/22/09 15:49	2147417
14808-79-8	Sulfate	300.0	250 ^	5.0	59	mg/L	---	09/21/09 23:31	2147417

Sampling Point: 2D 2028ppm NaCl

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	1900	mg/L	---	09/22/09 16:13	2147418
14808-79-8	Sulfate	300.0	250 ^	5.0	60	mg/L	---	09/21/09 23:59	2147418

Data for *Musculium transversum* chloride test and *Ligumia recta* sulfate test

Client Name: Illinois Natural History Survey

Report #: 233654

Sampling Point: 2E 4018ppm NaCl

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	4000	mg/L	---	09/22/09 16:38	2147419
14808-79-8	Sulfate	300.0	250 ^	5.0	59	mg/L	---	09/22/09 00:26	2147419

Sampling Point: 2F 8000ppm NaCl

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	7800	mg/L	---	09/22/09 17:02	2147420
14808-79-8	Sulfate	300.0	250 ^	5.0	60	mg/L	---	09/22/09 00:54	2147420

Sampling Point: 1A Control

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	3.0	mg/L	---	09/22/09 02:16	2147421
14808-79-8	Sulfate	300.0	250 ^	5.0	83	mg/L	---	09/22/09 02:16	2147421

Sampling Point: 1B 397ppm Sulfate

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	2.6	mg/L	---	09/22/09 03:39	2147422
14808-79-8	Sulfate	300.0	250 ^	5.0	380	mg/L	---	09/22/09 18:16	2147422

Sampling Point: 1C 703ppm Sulfate

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	2.8	mg/L	---	09/22/09 04:06	2147423
14808-79-8	Sulfate	300.0	250 ^	5.0	660	mg/L	---	09/22/09 19:29	2147423

Data for *Ligumia recta* sulfate test

Client Name: Illinois Natural History Survey

Report #: 233654

Sampling Point: 1D 1317ppm Sulfate

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	3.9	mg/L	---	09/22/09 04:34	2147424
14808-79-8	Sulfate	300.0	250 ^	5.0	1200	mg/L	---	09/22/09 19:54	2147424

Sampling Point: 1E 2545ppm Sulfate

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	4.3	mg/L	---	09/22/09 05:01	2147425
14808-79-8	Sulfate	300.0	250 ^	5.0	2300	mg/L	---	09/22/09 20:18	2147425

Sampling Point: 1F 5000ppm Sulfate

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	5.9	mg/L	---	09/22/09 05:29	2147426
14808-79-8	Sulfate	300.0	250 ^	5.0	4700	mg/L	---	09/22/09 20:43	2147426

Sampling Point: 2A Control

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	2.5	mg/L	---	09/22/09 05:56	2147427
14808-79-8	Sulfate	300.0	250 ^	5.0	85	mg/L	---	09/22/09 05:56	2147427

Sampling Point: 2B 397ppm Sulfate

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	2.7	mg/L	---	09/22/09 06:24	2147428
14808-79-8	Sulfate	300.0	250 ^	5.0	360	mg/L	---	09/22/09 21:07	2147428

Data for *Ligumia recta* sulfate test

Client Name: Illinois Natural History Survey

Report #: 233654

Sampling Point: 2C 703ppm Sulfate

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	2.9	mg/L	---	09/22/09 06:51	2147429
14808-79-8	Sulfate	300.0	250 ^	5.0	670	mg/L	---	09/22/09 21:31	2147429

Sampling Point: 2D 1317ppm Sulfate

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	3.3	mg/L	---	09/22/09 07:19	2147430
14808-79-8	Sulfate	300.0	250 ^	5.0	1200	mg/L	---	09/22/09 21:56	2147430

Sampling Point: 2E 2545ppm Sulfate

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	4.8	mg/L	---	09/23/09 10:49	2147431
14808-79-8	Sulfate	300.0	250 ^	5.0	2400	mg/L	---	09/22/09 22:20	2147431

Sampling Point: 2F 5000ppm Sulfate

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	6.1	mg/L	---	09/23/09 11:14	2147432
14808-79-8	Sulfate	300.0	250 ^	5.0	5400	mg/L	---	09/22/09 22:45	2147432

† UL has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Reg Limit Type:	MCL	SMCL	AL
Symbol:	*	^	!



Underwriters Laboratories

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South Bend, IN 46617
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Order # 105747
Page 2 of 2

CHAIN OF CUSTODY RECORD

REPORT TO: Amy Dickinson
 Dickinson @ illinois.edu
 U of I / INHS
 1816 S. Oak St.
 Champaign, IL 61820

SAMPLER (Signature): Amy Dickinson
 COMPLIANCE MONITORING: Yes No

STATE (of sample origin): IL
 POPULATION SERVED: Ruv
 SOURCE WATER: Sulfate

PROJECT NAME: Ligumix
 PWS ID#: Sulfate

TEST NAME: Sulfate AND Chloride
 SAMPLE REMARKS: Not spiked
 CHLORINATED: YES NO

OF CONTAINERS: 1
 MATRIX CODE: PWS
 TURNAROUND TIME: PWS

LAB NUMBER	COLLECTION		SAMPLING SITE	TEST NAME	SAMPLE REMARKS	CHLORINATED	# OF CONTAINERS	MATRIX CODE	TURNAROUND TIME
	DATE	TIME							
1	9/10/09	11	1A Control	Sulfate AND Chloride	Not spiked	<input checked="" type="checkbox"/>	1	PWS	SW
2	9/10/09	2	1B 397 ppm sulfate		Spiked	<input checked="" type="checkbox"/>	1	PWS	SW
3	9/10/09	2	1C 703 ppm sulfate		Spiked	<input checked="" type="checkbox"/>	1	PWS	SW
4	9/10/09	2	1D 1317 ppm sulfate		Spiked	<input checked="" type="checkbox"/>	1	PWS	SW
5	9/10/09	2	1E 2545 ppm sulfate		Spiked	<input checked="" type="checkbox"/>	1	PWS	SW
6	9/10/09	2	1F 5000 ppm sulfate		Spiked	<input checked="" type="checkbox"/>	1	PWS	SW
7	9/14/09	1	2A Control		Not spiked	<input checked="" type="checkbox"/>	1	PWS	SW
8	9/14/09	1	2B 397 ppm sulfate		Spiked	<input checked="" type="checkbox"/>	1	PWS	SW
9	9/14/09	1	2C 703 ppm sulfate		Spiked	<input checked="" type="checkbox"/>	1	PWS	SW
10	9/14/09	1	2D 1317 ppm sulfate		Spiked	<input checked="" type="checkbox"/>	1	PWS	SW
11	9/14/09	1	2E 2545 ppm sulfate		Spiked	<input checked="" type="checkbox"/>	1	PWS	SW
12	9/14/09	1	2F 5000 ppm sulfate		Spiked	<input checked="" type="checkbox"/>	1	PWS	SW
13									
14									

RELINQUISHED BY (Signature): Amy Dickinson
 DATE: 9/10/09
 TIME: 2:00 PM

RECEIVED BY (Signature): [Signature]
 DATE: 9/17/09
 TIME: 9:45 AM

RELINQUISHED BY (Signature): [Signature]
 DATE: 9/17/09
 TIME: 9:45 AM

RECEIVED BY (Signature): [Signature]
 DATE: 9/17/09
 TIME: 9:45 AM

RELINQUISHED BY (Signature): [Signature]
 DATE: 9/17/09
 TIME: 9:45 AM

RECEIVED BY (Signature): [Signature]
 DATE: 9/17/09
 TIME: 9:45 AM

MATRIX CODES:
 DM-DRINKING WATER
 GM-GROUND WATER
 EM-EXPOSURE WATER
 SM-SURFACE WATER
 PW-POOL WATER
 WW-WASTE WATER

SW = Standard Written: (15 working days) 0%
 RV* = Rush Verbal: (5 working days) 50%
 RW* = Rush Written: (5 working days) 75%
 IV* = Immediate Verbal
 IW* = Immediate Written
 SP* = Weekend, Hold
 STAT* = Less than 48

UL-S5N-SHIP-F-002

Sample analysis will be provided according to the standard UL GSA/Water Services Terms, which are available upon request unless expressly agreed to in writing by UL.

IGNORE ORDER # AND ANALYZE FOR CHLORIDE AND SULFATE.
All samples except Controls (1A + 2A) SPIKED with SULFATE @ rates of 397 - 5000 ppm as labeled per sample.

announced holding time subject to alterations and are

Statistical Analyses

CT-TOX: BINOMIAL, MOVING AVERAGE, PROBIT, AND SPEARMAN METHODS

SPEARMAN-KARBER

TRIM: .00%
LC50: 3440.096
95% CONFIDENCE LIMITS
ARE UNRELIABLE.

CONC. mg/L	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
370.00	20.	0.	.00	.9537D-04
665.00	20.	0.	.00	.9537D-04
1200.00	20.	0.	.00	.9537D-04
2349.00	20.	0.	.00	.9537D-04
5038.00	20.	20.	100.00	.9537D-04

THE BINOMIAL TEST SHOWS THAT 2349.00 AND 5038.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.9998 PERCENT. AN APPROXIMATE LC50 FOR THIS DATA SET IS 3440.096

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

DATE: September 10, 2009 TEST NUMBER: DURATION: 24 h
SAMPLE: sulfate SPECIES: Ligumia recta

METHOD	LC50	CONFIDENCE LIMITS
	LOWER	UPPER SPAN
BINOMIAL	*****	*****
MAA	*****	*****
PROBIT	*****	*****
SPEARMAN	*****	*****

**** = LIMIT DOES NOT EXIST

SPEARMAN-KARBER

TRIM: .00%
LC50: 3440.096
95% CONFIDENCE LIMITS
ARE UNRELIABLE.

CONC. mg/L	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
370.00	20.	0.	.00	.9537D-04
665.00	20.	0.	.00	.9537D-04
1200.00	20.	0.	.00	.9537D-04
2349.00	20.	0.	.00	.9537D-04
5038.00	20.	20.	100.00	.9537D-04

THE BINOMIAL TEST SHOWS THAT 2349.00 AND 5038.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.9998 PERCENT. AN APPROXIMATE LC50 FOR THIS DATA SET IS 3440.096

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

DATE: September 10, 2009 TEST NUMBER: DURATION: 48 h
SAMPLE: sulfate SPECIES: Ligumia recta

METHOD	LC50	CONFIDENCE LIMITS
	LOWER	UPPER SPAN
BINOMIAL	*****	*****
MAA	*****	*****
PROBIT	*****	*****
SPEARMAN	*****	*****

**** = LIMIT DOES NOT EXIST

SPEARMAN-KARBER

TRIM: .00%
LC50: 1937.938
95% LOWER CONFIDENCE: 1704.552
95% UPPER CONFIDENCE: 2203.279

CONC. mg/L	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
370.00	20.	0.	.00	.9537D-04
665.00	20.	0.	.00	.9537D-04
1200.00	20.	0.	.00	.9537D-04
2349.00	20.	16.	80.00	.5909D+00
5038.00	20.	20.	100.00	.9537D-04

THE BINOMIAL TEST SHOWS THAT 1200.00 AND 2349.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.4090 PERCENT. AN APPROXIMATE LC50 FOR THIS DATA SET IS 1906.316

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

DATE: September 10, 2009 TEST NUMBER: DURATION: 72 h
SAMPLE: sulfate SPECIES: Ligumia recta

METHOD	LC50	CONFIDENCE LIMITS
	LOWER	UPPER SPAN
BINOMIAL	*****	***** *****
MAA	*****	***** *****
PROBIT	*****	***** *****
SPEARMAN	*****	***** 498.728

**** = LIMIT DOES NOT EXIST

SPEARMAN-KARBER

TRIM: .00%
LC50: 1483.041
95% LOWER CONFIDENCE: 1320.701
95% UPPER CONFIDENCE: 1665.335

CONC. mg/L	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
370.00	20.	0.	.00	.9537D-04
665.00	20.	1.	5.00	.2003D-02
1200.00	20.	3.	15.00	.1288D+00
2349.00	20.	20.	100.00	.9537D-04
5038.00	20.	20.	100.00	.9537D-04

THE BINOMIAL TEST SHOWS THAT 1200.00 AND 2349.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE

LEVEL ASSOCIATED WITH THESE LIMITS IS 99.8711 PERCENT.
AN APPROXIMATE LC50 FOR THIS DATA SET IS 1519.358

RESULTS USING MOVING AVERAGE
SPAN G LC50 95% CONFIDENCE LIMIT
4 .051 1399.19 1149.12 1722.41

***** RESULTS CALCULATED BY PROBIT METHOD
ITERATIONS G H GOODNESS OF FIT
8 1.375 2.98 .03

SINCE THE PROBABILITY IS LESS THAN 0.05,
RESULTS CALCULATED USING THE PROBIT METHOD
PROBABLY SHOULD NOT BE USED.

SLOPE = 7.55
95% CONFIDENCE LIMITS: -1.30 AND 16.40

LC50= 1421.48
95% CONFIDENCE LIMITS: 0 AND + INFINITY

LC1 = 698.88
95% CONFIDENCE LIMITS: 0 AND 1124.33

DATE: September 10, 2009 TEST NUMBER: DURATION: 96 h
SAMPLE: sulfate SPECIES: Ligumia recta

METHOD LC50 CONFIDENCE LIMITS
LOWER UPPER SPAN
BINOMIAL *****
MAA ***** 573.291
PROBIT *****
SPEARMAN ***** 344.634

**** = LIMIT DOES NOT EXIST

**Appendix 33: Raw Data for 96-hour Toxicity of
Sulfate on *Megalonaias nervosa***

Raw Laboratory Data

96 Hour Water Column Acute Test Data Sheet/ 6 treatments												
Toxicant: Sulfate			Species: <i>M. nervosa</i>									
Rate: 7.263g/L Na2SO4			50% serial dilution									
Water: EPA(MHRW)-B 10.5-09 B			Culture: Tony Brady, FWS, Coenoa, WI.									
Start Date/Time: 10/16/09 3pm			Age: Dmp off date 10/14/09				Initials: AD, DS					
Temp/Light: 20°C 16:8			Glassware: 50ml glass beakers, 40ml overlying H2O									
Treatment	rep	Survival					Chem					
		0 h	24 h	48 h	72 h	96 h		0h	24h	48h	72h	96h
A Control	1	S	S	S	S	S	temp	21.0	20.9	20.5	20.9	20.6
	2	S	S	S	S	S	pH	7.8	7.8	7.8	7.9	7.9
	3	S	S	S	S	S	cond	300	300	308	324	364
	4	S	S	S	S	S	D.O.	7.95	8.30	8.21	8.28	8.18
							Alk	60	x	x	x	68
							Hard	85	x	x	x	94
B 397	1	S	S	S	S	S	temp	21.0	20.8	20.4	20.9	20.7
	2	S	4	4	4	4	pH	8.0	7.9	7.9	8.0	8.0
	3	S	S	S	S	S	cond	1021	1016	1020	1021	1104
	4	S	S	S	4	4	D.O.	8.24	8.38	8.27	8.40	8.20
							Alk	60	x	x	x	68
							Hard	88	x	x	x	88
C 703	1	S	S	S	S	S	temp	21.0	20.9	20.4	20.9	20.7
	2	S	S	S	S	S	pH	8.0	8.0	8.0	8.0	8.0
	3	S	S	S	S	S	cond	1702	1695	1698	1696	1853
	4	S	S	S	4	4	D.O.	8.21	8.35	8.23	8.29	8.25
							Alk	62	x	x	x	68
							Hard	90	x	x	x	88
D 1317	1	S	S	S	S	S	temp	21.0	21.0	20.5	20.9	20.8
	2	S	S	S	S	S	pH	8.1	8.0	8.0	8.0	8.0
	3	S	S	S	S	S	cond	2940	2920	2930	2940	3230
	4	S	S	S	S	S	D.O.	8.28	8.32	8.28	8.40	8.24
							Alk	62	x	x	x	68
							Hard	90	x	x	x	90
E 2545	1	S	S	S	S	S	temp	21.0	20.9	20.5	20.8	20.8
	2	S	S	S	S	S	pH	8.2	8.1	8.1	8.2	8.1
	3	S	S	S	4	4	cond	5320	5280	5295	5290	5600
	4	S	S	S	4	4	D.O.	8.22	8.30	8.20	8.38	8.20
							Alk	62	x	x	x	68
							Hard	90	x	x	x	92
F 5000	1	S	0	0	0	0	temp	21.0	21.0	20.5	20.8	20.9
	2	S	0	0	0	0	pH	8.3	8.2	8.2	8.3	8.2
	3	S	0	0	0	0	cond	9550	9540	9540	9540	10320
	4	S	0	0	0	0	D.O.	8.26	8.28	8.00	8.32	8.37
							Alk	62	x	x	x	68
							Hard	94	x	x	x	92
Initials		DS	AP	AD	HD	AD						

Analytical Chemistry Data

LABORATORY REPORT

This report contains 7 pages.
(including the cover page)

If you have any questions concerning this report, please do not hesitate to call us at
(800) 332-4345 or (574) 233-4777.

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Underwriters Laboratories Inc. (UL).*

Laboratory Report

Client: Illinois Natural History Survey
Attn: Amy Dickinson
1910 South Griffith Drive
Champaign, IL 61820

Report: 235642
Priority: Standard Written
Status: Final
PWS ID: Not Supplied

Copies to: None

Sample Information					
UL ID #	Client ID	Method	Collected Date / Time	Collected By:	Received Date / Time
2167628	1A Control M. Nervosa IN	300.0	10/16/09 00:00	Client	10/23/09 10:00
2167629	1B 397ppm Sulfate IN	300.0	10/16/09 00:00	Client	10/23/09 10:00
2167630	1C 703ppm Sulfate IN	300.0	10/16/09 00:00	Client	10/23/09 10:00
2167631	1D 1317ppm Sulfate IN	300.0	10/16/09 00:00	Client	10/23/09 10:00
2167632	1E 2545ppm Sulfate IN	300.0	10/16/09 00:00	Client	10/23/09 10:00
2167633	1F 5000ppm Sulfate IN	300.0	10/16/09 00:00	Client	10/23/09 10:00
2167634	2A Control M. Nervosa OUT	300.0	10/20/09 00:00	Client	10/23/09 10:00
2167635	2B 397ppm Sulfate OUT	300.0	10/20/09 00:00	Client	10/23/09 10:00
2167636	2C 703ppm Sulfate OUT	300.0	10/20/09 00:00	Client	10/23/09 10:00
2167637	2D 1317ppm Sulfate OUT	300.0	10/20/09 00:00	Client	10/23/09 10:00
2167638	2E 2545ppm Sulfate OUT	300.0	10/20/09 00:00	Client	10/23/09 10:00
2167639	2F 5000ppm Sulfate OUT	300.0	10/20/09 00:00	Client	10/23/09 10:00

Report Summary

Project: M. Nervosa Sulfate

Detailed quantitative results are presented on the following pages. The results presented relate only to the samples provided for analysis.

We appreciate the opportunity to provide you with this analysis. If you have any questions concerning this report, please do not hesitate to call Kelly Trott at (574) 233-4777.

Note: This report may not be reproduced, except in full, without written approval from Underwriters Laboratories (UL).




 Authorized Signature Title Date

Client Name: Illinois Natural History Survey
Report #: 235642

Client Name: Illinois Natural History Survey

Report #: 235642

Sampling Point: 1A Control M. Nervosa IN

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	2.4	mg/L	---	10/27/09 14:37	2167628
14808-79-8	Sulfate	300.0	250 ^	5.0	83	mg/L	---	10/27/09 14:37	2167628

Sampling Point: 1B 397ppm Sulfate IN

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	2.4	mg/L	---	10/27/09 15:01	2167629
14808-79-8	Sulfate	300.0	250 ^	5.0	380	mg/L	---	10/27/09 21:09	2167629

Sampling Point: 1C 703ppm Sulfate IN

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	2.7	mg/L	---	10/27/09 15:26	2167630
14808-79-8	Sulfate	300.0	250 ^	5.0	680	mg/L	---	10/27/09 21:33	2167630

Sampling Point: 1D 1317ppm Sulfate IN

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	3.1	mg/L	---	10/27/09 15:50	2167631
14808-79-8	Sulfate	300.0	250 ^	5.0	1200	mg/L	---	10/27/09 21:58	2167631

Sampling Point: 1E 2545ppm Sulfate IN

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	4.0	mg/L	---	10/27/09 16:15	2167632
14808-79-8	Sulfate	300.0	250 ^	5.0	2400	mg/L	---	10/28/09 13:46	2167632

Client Name: Illinois Natural History Survey

Report #: 235642

Sampling Point: 1F 5000ppm Sulfate IN

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	5.7	mg/L	---	10/27/09 17:26	2167633
14808-79-8	Sulfate	300.0	250 ^	5.0	4700	mg/L	---	10/28/09 14:10	2167633

Sampling Point: 2A Control M. Nervosa OUT

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	2.4	mg/L	---	10/27/09 17:53	2167634
14808-79-8	Sulfate	300.0	250 ^	5.0	90	mg/L	---	10/27/09 17:53	2167634

Sampling Point: 2B 397ppm Sulfate OUT

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	2.6	mg/L	---	10/27/09 18:17	2167635
14808-79-8	Sulfate	300.0	250 ^	5.0	380	mg/L	---	10/28/09 14:35	2167635

Sampling Point: 2C 703ppm Sulfate OUT

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	2.8	mg/L	---	10/27/09 18:42	2167636
14808-79-8	Sulfate	300.0	250 ^	5.0	700	mg/L	---	10/28/09 14:59	2167636

Sampling Point: 2D 1317ppm Sulfate OUT

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	3.3	mg/L	---	10/27/09 19:06	2167637
14808-79-8	Sulfate	300.0	250 ^	5.0	1300	mg/L	---	10/28/09 15:22	2167637

Client Name: Illinois Natural History Survey

Report #: 235642

Sampling Point: 2E 2545ppm Sulfate OUT

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	4.3	mg/L	---	10/27/09 19:31	2167838
14808-79-6	Sulfate	300.0	250 ^	5.0	2800	mg/L	---	10/28/09 15:45	2167838

Sampling Point: 2F 5000ppm Sulfate OUT

PWS ID: Not Supplied

General Chemistry									
Analyte ID #	Analyte	Method	Reg Limit	MRL†	Result	Units	Preparation Date	Analyzed Date	UL ID #
16887-00-6	Chloride	300.0	250 ^	2.0	6.3	mg/L	---	10/27/09 19:55	2167639
14808-79-6	Sulfate	300.0	250 ^	5.0	5600	mg/L	---	10/28/09 16:08	2167639

† UL has demonstrated it can achieve these report limits in reagent water, but can not document them in all sample matrices.

Reg Limit Type:	MCL	SMCL	AL
Symbol:	*	^	!

Lab Definitions

Continuing Calibration Check Standard (CCC), Continuing Calibration Verification (CCV) - is a single level, working standard containing one or more of the target analytes that is prepared from the same standards used to calibrate the instrument. The CCC is used to validate the calibration curve at the beginning of each analytical sequence, and may also be analyzed throughout and at the end of the sequence. The concentration of the check standard may be varied, when prescribed by the reference method, so that the entire linear range of the calibration curve is validated on a regular basis.

Internal Standards (IS) - are pure compounds with properties similar to the analytes of interest, which are added to field samples or extracts, calibration standards, and quality control standards at a known concentration. They are used to measure the relative responses of the analytes of interest and surrogates in the sample, calibration standard or quality control standard.

Laboratory Duplicate (LD) - is a field sample aliquot taken from the same sample container in the laboratory and analyzed separately using identical procedures. Analysis of laboratory duplicates provides a measure of the precision of the laboratory procedures.

Laboratory Fortified Blank (LFB) / Laboratory Control Sample (LCS) - is an aliquot of reagent water to which known concentrations of the analytes of interest are added. The LFB is analyzed exactly the same as the field samples. LFBs are used to determine whether the method is in control.

Laboratory Method Blank (LMB) / Laboratory Reagent Blank (LRB) - is a sample of reagent water included in the sample batch analyzed in the same way as the associated field samples. The LMB is used to determine if method analytes or other background contamination have been introduced during the preparation or analytical procedure. The LMB is analyzed exactly the same as the field samples.

Laboratory Trip Blank (LTB) - is a sample of laboratory reagent water placed in a sample container in the laboratory and treated as a field sample, including storage, preservation, and all analytical procedures. The LTB container follows the collection bottles to and from the collection site, but the LTB is not opened at any time during the trip. LTB is not exposed to site conditions or pumping and collection equipment. The LTB is primarily a travel blank used to verify that the samples were not contaminated during shipment.

Matrix Spike Duplicate Sample (MSD) / Laboratory Fortified Matrix Duplicate (LFD) - is a sample aliquot taken from the same field sample source as the Matrix Spike Sample to which known quantities of the analytes of interest are added in the laboratory. The MSD is analyzed exactly the same as the field samples. Analysis of the MSD provides a measure of the precision of the laboratory procedures in a specific matrix.

Matrix Spike Sample (MS) / Laboratory Fortified Matrix (LFM) - is a sample aliquot taken from field sample source to which known quantities of the analytes of interest are added in the laboratory. The MS is analyzed exactly the same as the field samples. The purpose is to demonstrate recovery of the analytes from a sample matrix to determine if the specific matrix contributes bias to the analytical results.

Quality Control Standard (QCS) / Second Source Calibration Verification (SSCV) - is a solution containing known concentrations of the analytes of interest prepared from a source different from the source of the calibration standards. The QCS sample is analyzed using the same procedures as field samples. The QCS is used as a check on the calibration standards used in the method on a routine basis. The QCS is analyzed with every new calibration curve and at least quarterly unless the reference method requires a more frequent usage.

Reporting Limit Check (RLC) - is a procedural standard that is analyzed each day to evaluate instrument performance at or below the minimum reporting limit (MRL).

Surrogate Standard (SS) / Surrogate Analyte (SUR) - is a pure compound with properties similar to the analytes of interest, which is highly unlikely to be found in any field sample, that is added to the field samples, calibration standards, blanks and quality control standards before sample preparation. The SS is used to evaluate the efficiency of the sample preparation process.



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CHAIN OF CUSTODY RECORD

Page 1 of 2

REPORT TO: *dickinson@illinois.edu*
BILL TO: Amy Dickinson
1910 S. Griffith Dr.
Champaign, IL 61820

SAMPLER (Signature) *Amy Dickinson*
COMPLIANCE MONITORING Yes No

STATE (if sample origin) IL
POPULATION SERVED
SOURCE WATER RW

PROJECT NAME M. nervous
Sulfate

OF CONTAINERS 1
MATRIX CODE RW SW
TURNAROUND TIME

LAB NUMBER	COLLECTION		SAMPLING SITE	TEST NAME	SAMPLE REMARKS	CHLORINATED		# OF CONTAINERS	MATRIX CODE	TURNAROUND TIME
	DATE	TIME				YES	NO			
1	2/17	6:28	1A Control M. nervous IN	CHLORIDE AND SULFATE	NOT SPIKED			1	RW SW	
2		6:29	1B 397 ppm Sulfate IN		SPIKED			1	RW SW	
3		6:30	1C 703 ppm Sulfate IN					1	RW SW	
4		6:31	1D 1317 ppm Sulfate IN					1	RW SW	
5		6:32	1E 2545 ppm Sulfate IN					1	RW SW	
6		6:33	1F 5000 ppm Sulfate IN					1	RW SW	
7		6:34	2A Control M. nervous OUT		NOT SPIKED			1	RW SW	
8		6:35	2B 897 ppm Sulfate OUT		SPIKED			1	RW SW	
9		6:36	2C 703 ppm Sulfate OUT					1	RW SW	
10		6:37	2D 1317 ppm Sulfate OUT					1	RW SW	
11		6:38	2E 2545 ppm Sulfate OUT					1	RW SW	
12		6:39	2F 5000 ppm Sulfate OUT					1	RW SW	
13										
14										

RELINQUISHED BY (Signature) *Amy Dickinson* DATE 10/22 TIME 2:25 RECEIVED BY (Signature) _____ DATE _____ TIME _____
 RELINQUISHED BY (Signature) _____ DATE _____ TIME _____ RECEIVED BY (Signature) _____ DATE _____ TIME _____
 RELINQUISHED BY (Signature) _____ DATE _____ TIME _____ RECEIVED BY (Signature) _____ DATE _____ TIME _____

MATRIX CODES:
 DW-DRINKING WATER
 RW-REAGENT WATER
 GW-GROUND WATER
 EW-EXPOSURE WATER
 SW-SURFACE WATER
 PW-POOL WATER
 WW-WASTE WATER

SW = Standard Written: (5 working days) 0%
 RW = Rush Written: (3 working days) 50%
 RW = Rush Written: (5 working days) 75%

TURNAROUND TIME (TAT) - SURCHARGES:
 1V = Immediate Verbal: (3 working days) 100%
 1W = Immediate Written: (3 working days) 125%
 SW = Weekend Holiday
 STAT* = Less than 48 hours
 UL-SBW-SHIP-1-002-09 Effective Date: 05/08/2009

Sample analysis will be provided according to the standard UL GSW/Water Services Terms, which are available upon request. Any other terms proposed by Customer are deemed material alterations and are rejected unless expressly agreed to in writing by UL.

LAB RESERVES THE RIGHT TO RETURN UNUSED PORTIONS OF NON-HAZARDOUS SAMPLES TO CLIENT
 RECOVERIES: Please Note: All samples spiked with Sulfate except Controls (AD) (B)

Signature: *[Signature]* Date: 10/22/09
 Title: *[Title]*

Statistical Analyses

CT-TOX: BINOMIAL, MOVING AVERAGE, PROBIT, AND SPEARMAN METHODS

SPEARMAN-KARBER

TRIM: 1.25%
LC50: 3563.501
95% CONFIDENCE LIMITS
ARE UNRELIABLE.

CONC. mg/L	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
380.00	20.	1.	5.00	.2003D-02
690.00	20.	0.	.00	.9537D-04
1249.00	20.	0.	.00	.9537D-04
2498.00	20.	0.	.00	.9537D-04
5130.00	20.	20.	100.00	.9537D-04

THE BINOMIAL TEST SHOWS THAT 2498.00 AND 5130.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.9998 PERCENT. AN APPROXIMATE LC50 FOR THIS DATA SET IS 3579.768

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

DATE: 10/16/2009 TEST NUMBER: DURATION: 24 h
SAMPLE: sulfate SPECIES: Megaloniais nervosa

METHOD	LC50	CONFIDENCE LIMITS		
	LOWER	UPPER	SPAN	
BINOMIAL	*****	*****	*****	*****
MAA	*****	*****	*****	*****
PROBIT	*****	*****	*****	*****
SPEARMAN	*****	*****	*****	*****

NOTE: MORTALITY PROPORTIONS WERE NOT MONOTONICALLY INCREASING.
ADJUSTMENTS WERE MADE PRIOR TO SPEARMAN-KARBER ESTIMATION.

*** = LIMIT DOES NOT EXIST

SPEARMAN-KARBER

TRIM: 1.25%
LC50: 3563.501
95% CONFIDENCE LIMITS
ARE UNRELIABLE.

CONC. mg/L	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
380.00	20.	1.	5.00	.2003D-02
690.00	20.	0.	.00	.9537D-04
1249.00	20.	0.	.00	.9537D-04
2498.00	20.	0.	.00	.9537D-04
5130.00	20.	20.	100.00	.9537D-04

THE BINOMIAL TEST SHOWS THAT 2498.00 AND 5130.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE LEVEL ASSOCIATED WITH THESE LIMITS IS 99.9998 PERCENT. AN APPROXIMATE LC50 FOR THIS DATA SET IS 3579.768

WHEN THERE ARE LESS THAN TWO CONCENTRATIONS AT WHICH THE PERCENT DEAD IS BETWEEN 0 AND 100, NEITHER THE MOVING AVERAGE NOR THE PROBIT METHOD CAN GIVE ANY STATISTICALLY SOUND RESULTS.

DATE: 10/16/2009 TEST NUMBER: DURATION: 48 h
SAMPLE: sulfate SPECIES: Megaloniais nervosa

METHOD	LC50	CONFIDENCE LIMITS		
		LOWER	UPPER	SPAN
BINOMIAL	*****	*****	*****	*****
MAA	*****	*****	*****	*****
PROBIT	*****	*****	*****	*****
SPEARMAN	*****	*****	*****	*****

NOTE: MORTALITY PROPORTIONS WERE NOT MONOTONICALLY INCREASING.
ADJUSTMENTS WERE MADE PRIOR TO SPEARMAN-KARBER ESTIMATION.

*** = LIMIT DOES NOT EXIST

SPEARMAN-KARBER

TRIM: 5.00%
LC50: 3377.635
95% LOWER CONFIDENCE: 3020.860
95% UPPER CONFIDENCE: 3776.547

CONC. mg/L	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
380.00	20.	2.	10.00	.2012D-01
690.00	20.	1.	5.00	.2003D-02
1249.00	20.	0.	.00	.9537D-04
2498.00	20.	2.	10.00	.2012D-01
5130.00	20.	20.	100.00	.9537D-04

THE BINOMIAL TEST SHOWS THAT 2498.00 AND 5130.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE

LEVEL ASSOCIATED WITH THESE LIMITS IS 99.9798 PERCENT.
AN APPROXIMATE LC50 FOR THIS DATA SET IS 3311.148

THE MOVING AVERAGE METHOD CANNOT BE USED WITH THIS DATA SET BECAUSE NO SPAN WHICH PRODUCES AVERAGE ANGLES BRACKETING 45 DEGREES ALSO USES TWO PERCENT DEAD BETWEEN 0 AND 100 PERCENT.

NO CONVERGENCE IN 25 ITERATIONS. PROBIT METHOD PROBABLY CAN NOT BE USE WITH THIS SET OF DATA.

DATE: 10/16/2009 TEST NUMBER: DURATION: 72 h
SAMPLE: sulfate SPECIES: Megaloniais nervosa

METHOD	LC50	CONFIDENCE LIMITS		
		LOWER	UPPER	SPAN
BINOMIAL	*****	*****	*****	*****
MAA	*****	*****	*****	*****
PROBIT	*****	*****	*****	*****
SPEARMAN	*****	*****	*****	755.687

NOTE: MORTALITY PROPORTIONS WERE NOT MONOTONICALLY INCREASING.
ADJUSTMENTS WERE MADE PRIOR TO SPEARMAN-KARBER ESTIMATION.

**** = LIMIT DOES NOT EXIST

SPEARMAN-KARBER

TRIM: 5.00%
LC50: 3377.635
95% LOWER CONFIDENCE: 3020.860
95% UPPER CONFIDENCE: 3776.547

CONC. mg/L	NUMBER EXPOSED	NUMBER DEAD	PERCENT DEAD	BINOMIAL PROB.(%)
380.00	20.	2.	10.00	.2012D-01
690.00	20.	1.	5.00	.2003D-02
1249.00	20.	0.	.00	.9537D-04
2498.00	20.	2.	10.00	.2012D-01
5130.00	20.	20.	100.00	.9537D-04

THE BINOMIAL TEST SHOWS THAT 2498.00 AND 5130.00 CAN BE USED AS STATISTICALLY SOUND CONSERVATIVE 95 PERCENT CONFIDENCE LIMITS SINCE THE ACTUAL CONFIDENCE

LEVEL ASSOCIATED WITH THESE LIMITS IS 99.9798 PERCENT.
AN APPROXIMATE LC50 FOR THIS DATA SET IS 3311.148

THE MOVING AVERAGE METHOD CANNOT BE USED WITH THIS DATA SET BECAUSE NO SPAN WHICH PRODUCES AVERAGE ANGLES BRACKETING 45 DEGREES ALSO USES TWO PERCENT DEAD BETWEEN 0 AND 100 PERCENT.

NO CONVERGENCE IN 25 ITERATIONS. PROBIT METHOD PROBABLY CAN NOT BE USE WITH THIS SET OF DATA.

DATE: 10/16/2009 TEST NUMBER: DURATION: 96 h
SAMPLE: sulfate SPECIES: Megaloniais nervosa

METHOD	LC50	CONFIDENCE LIMITS		
		LOWER	UPPER	SPAN
BINOMIAL	*****	*****	*****	*****
MAA	*****	*****	*****	*****
PROBIT	*****	*****	*****	*****
SPEARMAN	*****	*****	*****	755.687

NOTE: MORTALITY PROPORTIONS WERE NOT MONOTO MONOTONICALLY INCREASING.
ADJUSTMENTS WERE MADE PRIOR TO SPEARMAN-KARBER ESTIMATION.

**** = LIMIT DOES NOT EXIST
