DATA EVALUATION RECORD AQUATIC INVERTEBRATE LIFE CYCLE TEST GUIDELINE 72-4(B)

Text Searchable File

1. <u>CHEMICAL</u> : Cypermet	PC Code No.:	109702	
2. <u>TEST MATERIAL</u> : $[^{14}C]\beta$ -Cypermethrin		Radiopurity:	>95%
3. <u>CITATION</u> :			a
<u>Authors</u> :	Joseph V. Sousa		
<u>Title</u> :	[¹⁴ C] <i>β</i>-Cypermethrin -	Chronic Toxic	ity to
	Mysids (Mysidopsis b	<i>ahia</i>) Under Fl	ow-
	Through Conditions	• •	
Study Completion Date:	January 26, 1998		
Laboratory:	Springborn Laborator MA	ies, Inc., War	eham,
Sponsor:	ELF Atochem North Am	erica, Philade	lphia,
	PA	•	-
Laboratory Report ID:	97-12-7170		
MRID No.:	445460-35		
DP Barcode:	D246502		

4. <u>**REVIEWED BY</u>**: Karl Bullock, M.S., Environmental Scientist, Golder Associates Inc.</u>

Signature:

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Date: 7/22/98

APPROVED BY: Pim Kosalwat, Ph.D., Senior Scientist, Golder Associates Inc.

Signature: Y

P. Kosalwat Dates

Date: 7/22/98 Date: 3/10/03

5. <u>APPROVED BY</u>:

Signature:

6. STUDY PARAMETERS:

Age of Test Organism:<24 hours</th>Definitive Test Duration:28 daysStudy Method:Flow-ThroughType of Concentrations:Mean Measured

7. <u>CONCLUSIONS</u>: This study is scientifically sound and fulfills the guideline requirements for an estuarine invertebrate life cycle test using mysids. Based on mean measured concentrations and the most sensitive endpoints (survival and reproduction), the LOEC and NOEC for mysids exposed to $[^{14}C]\beta$ -Cypermethrin were 3.3 and 1.5 ng/L, respectively. The geometric-mean MATC was 2.2 ng/L.



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Results Synopsis

Most sensitive endpoint: Survival and Reproduction

NOEC: 1.5 ng/L LOEC: 3.3 ng/L MATC: 2.2 ng/L

LOEC's for specific effects

Young/Female
Reproductive Day: 3.3 ng/L
Survival: 3.3 ng/L
Male length: >3.3 ng/L >|.5
Female length: >3.3 ng/L >|.5
Male dry weight: >3.3 ng/L >|.5
Female dry weight: >3.3 ng/L >|.5

8. ADEQUACY OF THE STUDY:

A. Classification: Core.

B. Rationale: Fulfills the guideline requirements.

C. Repairability: N/A.

- 9. <u>MAJOR GUIDELINE DEVIATIONS</u>: Since there is no EPA SEP for a mysid life cycle toxicity test, ASTM's Standard Guide for Conducting Life-Cycle Toxicity Tests with Saltwater Mysids (E1191-90) was used as a guidance for this data evaluation.
 - 1. The concentration of solvent (acetone) was not reported.

10. MATERIALS AND METHODS:

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A. Biological System:

Guideline Criteria	Reported Information
Species: An estuarine shrimp species, preferably <i>Mysidopsis bahia</i>	Mysidopsis bahia
Duration 28 days/one generation	28 days
Source (or supplier)	In-house cultures

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Guideline Criteria	Reported Information		
Parental Acclimation 1) Parental stock must be maintained separately from the brood culture in dilution water and under test conditions.	1. Parental stock was maintained in the dilution water at test temperature.		
2) Mysids should be in good health.	2. Yes		
Parental Acclimation Period At least 14 days	≥14 days		
Chamber Location: Treatments should be randomly assigned to test chamber locations.	Yes		
Duration of the Test: A mysid test must not be terminated before 7 days past the median time of 1 st brood release in the control treatment.	Test was conducted for 28 days. Time to sexual maturation of surviving mysids was reported to be 14 days.		
<pre>Brood Stock: Test started with mysids: 1) from only one brood stock or 2) from brood stock which has not obtain sexual maturity or had been maintained for > 14 days in a laboratory with same food, water, temperature, and salinity used in the test.</pre>	Mysids were obtained from in- house cultures maintained for at least 14 days, in dilution water at test temperature.		

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Guideline Criteria	Reported Information
Distribution: No. of mysids before pairing: Minimum of 15 mysids per compartment, 2 compartments per chamber, 2 chambers per concentration for a total of 60/level.	<pre>Before pairing: 15 mysids/compartment; 2 compartments/test chamber; 2 replicate chambers/ treatment (60 mysids/level).</pre> After pairing:
No. of mysids after pairing: ≥ 20 randomly selected pairs/treatment (excess males should be held in separate compartment to replace paired males).	Up to 10 pairs/replicate chamber (20 pairs/treatment). The remaining mysids were held in one of the original retention chambers within each aquarium.
Pairing: 1) Should be conducted when most of the mysids are sexually mature (usually 10-14 days	1. Pairing was conducted when the mysids reached sexual maturation.
after test initiation). 2) Should be paired on the same day.	2. Mysids were paired in the control and all treatments on Day 14.
 Feeding: 1) Mysids should be fed live brine shrimp nauplii at least once daily. 2) 150 live brine shrimp nauplii per mysid per day or 75 twice a day is recommended. 	1. Mysids were fed live Artemia salina nauplii ad libitum two times daily during the test. Feedings were supplemented with Selco® (saturated fatty acids) prior to pairing and every other day during the reproductive phase.
	2. Not reported.
Counts: Live adult mysids should be counted at test initiation, at pairing, and daily after pairing.	Number of surviving mysids were counted at test initiation and at 24 hour intervals.
Live young must be counted and removed daily.	Live young were counted and removed daily beginning on Day 15 (the first day that young were present).
Missing or impinged animals should be recorded.	Dead mysids were removed when observed.

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Guideline Criteria	Reported Information
Controls: Survival in any control chamber (between pairing and test termination) must not be less than 70%.	73 and 85% survival in the negative and solvent controls, respectively.
Controls: Negative control and carrier control (when applicable) are required.	Negative control and solvent control (acetone)

B. <u>Physical System</u>:

Guideline Criteria	Reported Information
Test Water: 1) May be natural (sterilized and filtered) or a commercial mixture with a salinity between 15 and 30 g/kg, and free of pollutants.	1. Artificial seawater prepared by the addition of a commercially prepared salt formula (hw-MARINEMIX [®]) to soft freshwater, filtered through a 10- μ m filter and adjusted to a salinity of 25 t
2) During the test, salinity should be measured daily and the difference between highest and lowest must be less than	3%. The artificial seawater was aerated vigorously and screened for contaminants.
10 g/kg.	2. Salinity measured daily in each replicate was between 23
the beginning, end of test and	and 28% during the test.
weekly. Measured values should be between 7.6 and 8.2, and not deviate by more than one unit for more than 48 hours.	3. pH measured daily in each replicate was between 8.0 and 8.4 during the test.
 DO must be measured at each conc. at least once a week. (see details in ASTM) 	 DO measured daily in each replicate was maintained at ≥74% of saturation throughout the test.

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Guideline Criteria	Reported Information
<pre>Test Temperature: 1) Mean measured temperature for each chamber at test termination should be within 1°C of selected test temperature. For mysid shrimp, 27°C is recommended. 2) Each individual measured temperature must be within 3°C of the mean of the time- weighted averages. 3) Whenever temperature is measured concurrently in more than one test chamber the highest & lowest temp. must not differ by more than 2°C.</pre>	 Mean measured temperature for each chamber at test termination was 26°C, within one degree of the selected test temperature (25°C). Continuous temperature monitoring in replicate B of the control ranged from 23- 27°C; daily temperature measurements in all other replicates ranged from 25- 27°C. Individual daily temperature values were not provided in the raw data. According to the summary of daily measurements, the highest and lowest temperature did not differ more than 2°C.
Photoperiod: Recommend 16L/8D.	16-hour light/8-hour dark
Dosing Apparatus: Intermittent flow proportional diluters or continuous flow serial diluters with a dilution factor not greater than 0.5 (a minimum of 5 toxicant concentrations and a control).	Intermittent-flow proportional diluter with a dilution factor of approximately 0.5.
Toxicant Mixing: 1) Mixing chamber is recommended but not required;	 Not reported. Not reported.
 Aeration should not be used for mixing; It must be demonstrated that the test solution is completely mixed before intro. into the test system; Flow splitting accuracy must be within 10%. 	 Chemical analysis of test solutions resulted in mean recoveries ranging from 51 - 58% of nominal concentrations. Not reported.

Guideline Criteria	Reported Information
<pre>Test Vessels: 1) Material: all glass, No. 316 stainless steel, or perfluorocarbon plastic. 2) Size: 250 ml with 200 ml fill volume is preferred; 100 ml with 80 ml fill volume acceptable. 3) Test compartments: 90 or 140 mm inside diameter glass Petri dish bottoms with collars made of 200-250 μm mesh screen.</pre>	 Glass 39 X 20 X 25 cm with a solution volume fluctuating between 4 and 7 L. Retention chambers were 10- cm dia. glass petri dishes with 15-cm high Nitex[®] screen collars. Pairing chambers were glass jars (5.1-cm dia., 10-cm high) containing two 2- cm holes covered with 363-µm Nitex[®] screen.
Covers 1) Renewal: Test vessels should be covered with a glass plate.	1. N/A
2) Flow-through: Openings in the test compartments should be covered with nylon mesh or stainless steel screen.	2. Openings in test compartments were covered with Nitex [®] screen.
Flow Rate: 1) Flow rates should provide 5 to 10 volume additions per 24 hr.	1. 7.0 volume additions/24 hours
 2) Flow rate must maintain DO at or above 60% of saturation and maintain the toxicant level. 2) Motor systems calibrated 	2. DO maintained at ≥74% of saturation. Toxicant concentration was maintained between 51 and 58% of nominal concentrations.
before study and checked twice daily during test period.	3. Yes
Aeration: 1) Dilution water should be aerated to insure DO concentration at or near 100% saturation. 2) Test tanks may be aerated.	 Dilution water was aerated prior to use. No aeration was necessary in the test vessels.

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C. <u>Chemical System</u>:

L. NUMBER OF STREET

Guideline Criteria	Reported Information		
Concentrations: 1) Minimum of 5 concentrations and a control, all replicated, plus solvent control if appropriate.	1. Negative control, solvent control, 0.37, 0.75, 1.5, 3.0, and 6.0 ng/L		
2) Toxicant conc. must be measured in one tank at each toxicant level every week.	2. Toxicant concentrations were measured in both replicates of each treatment on Days 0, 7, 14, 21, and 28.		
3) One concentration must adversely affect a life stage and one concentration must not affect any life stage.	 LOEC and NOEC were obtained Measured concentrations 		
4) The measured conc. of the test material of any treatment should be at least 50% of the time-weighted average measured concentration for >10% of the duration of the test.	appeared consistent throughout the test period. 5. See above.		
5) The measured conc. for any treatment level should not be more than 30% higher than the time-weighted average measured conc. for more than 5% of the duration of the test.			
Solvents: 1) Should not exceed 0.1 ml/L in a flow-through system.	1. Not reported		
2) Following solvents are acceptable: triethylene glycol, methanol, acetone, ethanol.	2. Acetone		

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Comments: None.

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11. <u>REPORTED RESULTS</u>:

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Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	Yes
 At least 75% of the paired 1st generation females in the control produced young or The average number of young produced by the 1st generation females in the control(s) was more than 3. 	 Yes Average of 9.3 and 11.3 offspring/female in the negative and solvent controls, respectively (0.68 and 0.83 offspring per female reproductive day, respectively).
 Data Endpoints must include: Survival of first-generation mysids (female and male), Number of live young produced per female, Dry weight and length of each first-generation mysid alive at the end of the test (female and male), Incidence of pathological or histological effects, and observations of other effects or clinical signs. 	 Data include: Survival of first-generation mysids (female and male combined) Number of young produced per female reproductive day. Dry weight and total length of each first-generation male and female survivor. None noted.
Raw data included? (Y/N)	Yes

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Effects Data:

Toxic Concent (ng,	cant ration /1)	Survival	Number of Young per Female	Mean J Lengti	Cotal n (mm)	Me Dry Wa (T	an eight g)
Nom.	Meas.	୯ & ଦୁଂ	Repro. Day	đ	Ŷ	đ	ç
Control	<0.22	73	0.68	8.1	8.3	0.99	1.3
Solvent Control	<0.22	85	0.83	8.1	8.0	0.93	1.2
0.37	0.21	78	0.67	7.9	8.2	0.91	1.2
0.75	0.44	70	0.74	8.4	8.5	0.97	1.3
1.5	0.79	75	0.75	8.4	8.5	0.95	1.2
3.0	1.5	75	0.70	8.4	8.6	0.99	1.2
6.0	3.3	55 ^b	0.34 ^b	8.2	8.3	0.89	1.1

^a Represents survival of all first generation mysids (i.e., those paired for spawning and those maintained as extras).

^b Significantly reduced when compared to the control (p<0.05).

Toxicity Observations: No sublethal signs of toxicity were reported.

Statistical Results: Analysis compared treatments to the pooled controls. Percentage data (survival) were arcsine square-root transformed prior to analysis.

Endpoint	Method	NOEC (ng/L)	LOEC (ng/L)
Survival	Williams' Test	1.5	3.3
Reproduction	Williams' Test	1.5	3.3
Male Length*	Williams' Test	1.5	>1.5
Female Length*	Williams' Test	1.5	>1.5
Male Dry Weight*	Williams' Test	1.5	>1.5
Female Dry Weight*	Williams' Test	1.5	>1.5

* Growth parameters from the 3.3 ng/L treatment were not analyzed, due to the significant reduction in survival.

Endpoint	Method	NOEC (ng/L)	LOEC (ng/L)
Survival	Williams'	1.5	3.3
<pre># Young/female</pre>	Williams'	1.5	3.3
Male Length	Dunnett's	3.3	>3.3
Female Length	Dunnett's	3.3	>3.3
Male Dry Weight	Dunnett's	3.3	>3.3
Female Dry Weight	Dunnett's	3.3	>3.3

12. <u>REVIEWER'S STATISTICAL RESULTS</u>:

<u>Comments</u>: The reviewer used individual measurements in the analysis of growth data. Percent survival data were arcsine square-root transformed prior to analysis.

13. <u>**REVIEWER'S CONCLUSIONS:**</u> This study is scientifically sound and fulfills the guideline requirements for an invertebrate life cycle test. Based on mean measured concentrations and the most sensitive endpoints (survival and reproduction), the NOEC and LOEC for mysids exposed to $[^{14}C]\beta$ -Cypermethrin were 1.5 and 3.3 ng/L, respectively. The geometric-mean MATC was 2.2 ng/L. The study is classified as **Core**. Cypermethrin: Chronic Daphnid - Survival File: 44546035 Transform: ARC SINE(SQUARE ROOT(Y))

	WILLIAMS TEST (Isoto	nic	regression model	.) TABLE 1 0	F 2
GROUP	IDENTIFICATION		ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1 2 3 4 5 6	Solvent Control 0.21 0.44 0.79 1.5 3.3	2 2 2 2 2 2 2	0.850 0.780 0.700 0.750 0.750 0.550	1.178 1.085 0.991 1.049 1.052 0.836	1.178 1.085 1.031 1.031 1.031 0.836

Cypermethrin: Chronic Daphnid - Survival File: 44546035 Transform: ARC SINE(SQUARE ROOT(Y))

WILLIAMS TEST	(Isotonic	regression	model)	TABLE 2 OF	2		
IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM		
Solvent Control	1.178			·			
0.21	1.085	1.054		1.94	k= 1, v= 6		
0.44	1.031	1.669		2.06	k=2, v=6		
0.79	1.031	1.669		2.10	k=3, v=6		
1.5	1.031	1.669		2.12	k = 4, $v = 6$		
3.3	0.836	3.881	*	2.13	k=5, v=6		

s = 0.088

Note: df used for table values are approximate when v > 20.

Cypermethrin: Chronic Daphnid - #young/fem rep day File: 44546035 Transform: ARC SINE(SQUARE ROOT(Y))

	WILLIAMS TEST (Isoton	ic	regression model) TABLE 1 OF	2
GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1 2 3 4 5 6	Solvent Control 0.21 0.44 0.79 1.5 3.3	2 2 2 2 2 2 2 2	0.835 0.675 0.735 0.745 0.700 0.340	1.158 0.965 1.038 1.043 0.995 0.622	1.158 1.016 1.016 1.016 0.995 0.622

Cypermethrin: Chronic Daphnid - #young/fem rep day File: 44546035 Transform: ARC SINE(SQUARE ROOT(Y))

WILLIAMS TEST	(Isotonic	regression	model)	TABLE 2 C)F 2
IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Solvent Control 0.21 0.44 0.79 1.5 3.3	1.158 1.016 1.016 1.016 0.995 0.622	1.322 1.322 1.322 1.517 4.979	*	1.94 2.06 2.10 2.12 2.13	k= 1, v= 6 k= 2, v= 6 k= 3, v= 6 k= 4, v= 6 k= 5, v= 6

s = 0.108

Note: df used for table values are approximate when v > 20.

			-	10.49 Tuesday	July 7 1998				10:49 106	soay, July	7, 1998
••••••			TRT=1		, uu , , , , , , , , , , , , , , , , ,		General Cla	Linear Models ss Level Infor	Procedure mation		
							Class Le	vels Values			
variable	N	mean	Sta Dev		Maximum		TRT	6 1 11 1	II IV Solvent	v	
MLNGTH FLNGTH MWT	21 26 21 26	7.9380952 8.2461538 0.9100000 1.1676923	0.6208673 0.4178332 0.1319091 0.1563323	7.0000000 7.3000000 0.6500000	8.8000000 9.1000000 1.1200000 1.6800000		REP	2 A B			
		110/0723			1.400000		Number of o	bservations in	data set = 1	55	
			TRT=II				Group	Obs Depender	nt Variables		
Variable	N	Mean	Std Dev	Minimum	Maximum		1	127 MLNGTH M	WT		
MLNGTH FLNGTH MWT	25 17 25	8.4120000 8.4529412 0.9704000	0.3865661 0.4797364 0.1636938	7.5000000 7.4000000 0.6400000	8.900000 9.300000 1.2500000		2	136 FLNGTH F	WT		
FWT	17	1.2470588	0.2306991	0.8500000	1.6500000	NOTE: Variables presence o	in each gro r absence o	up are consist f missing valu	ent with resp les.	ect to the	•
			TRT=III				Cyperm	ethrin: Mysid	Life Cycle 10:49 Tue	sday, July	7, 1998
Variable	N	Mean	Std Dev	Minimum	Maximum		General	Linear Models	Procedure		
	16	8-3875000	0.3757215	7.4000000	9.300000	Dependent Variab	le: MLNGTH	Sum of	Noon		
MWT	16	0.9531250	0.0953393	0.7900000	1.1500000	Source	DF	Squares	Square	F Value	Pr > F
		1.1055172			1.0000000	Model	6	4.6235935	0.7705989	3.73	0.0019
			TRT=IV			Error	120	24.7682175	0.2064018		
Variable	N	Mean	Std Dev	Minimum	Maximum	Corrected Total	126	29.3918110			
MLNGTH	26	8-4153846	0.3402262	7.7000000	8,900000		R-Square	Ć C.V.	Root MSE	MLN	NGTH Mear
FLNGTH MWT FWT	19 26 19	8-6473684 0-9903846 1-2421053	0.3849508 0.1320449 0.1876930	7.7000000 0.7500000 0.8500000	9.4000000 1.3700000 1.4500000		0.157309	5.511316	0.4543		8.2433
						Source	DF	Type I SS	Mean Square	F Value	Pr > f
			TRT=Solvent			TRT REP	5 1	4.5583872 0.0652063	0.9116774 0.0652063	4.42 0.32	0.0010
Variable	N	Mean	Std Dev	Minimum	Maximum	Source	DF	Type III SS	Mean Square	F Value	Pr > F
ALNGTH	26	8.0692308	0.4913404	7.0000000	8.800000	TRT	5	4.5709329	0.9141866	4.43	0.0010
AWT FWT	26 25	0.9284615 1.1800000	0.1336471 0.2237186	0.6500000 0.7900000	1.2200000 1.7900000	REF	Cyperm	ethrin: Mysid	Life Cycle 10:49 Tue	esday, July	y 7, 1998
			TRT=V				General	Linear Models	Procedure		
						Dependent Variab	le: MWT	Sum of	Mean		
/ariable	N	Mean	Std Dev	Minimum	Maximum	Source	DF	Squares	Square	F Value	Pr > f
4LNGTH	13 20	8-2384615	0.4555920	7.4000000	8.900000	Model	6	0.1522994	0.0253832	1.40	0.220
4WT FWT	13	0.8838462	0.1175116	0.7000000	1.0600000	Error	120	2.1754739	0.0181289		
		Cypermeth	rin: Mysid Life	e Cycle		Corrected Total	126	2.3277732			

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File:44546	6035.out Page 3 R-Square	c.v.	Root MSE		MWT Mean		File:4454603	5.out Page 4		10:49	Tuesday, J	uly 7, 19	98
	0.065427	14.24980	0.1346		0.9449			Gener	al Linear Mode	als Procedure	e		
	25			-	D _ 1 F			Bonferroni (Dunn) T tests	for variable	e: MLNGTH		
Source	UF	1ype 1 55	Mean Square	F Value	Pr > r	ĺ	NOTE:	This test con	trols the type	e I experimen	ntwise erro	r rate bu	t
REP	1	0.0001082	0.0001082	0.01	0.9386			all pairwise	comparisons.	an error ra		Key's IUI	
Source	DF	Type III SS	Mean Square	F Value	Pr > F		Alp	ha= 0.05 Con Cri	fidence= 0.95 tical Value of	df= 120 M T= 2.99510	SE= 0.20640	2	
TRT REP	5 1	0.1522765 0.0001082	0.0304553 0.0001082	1.68 0.01	0.1446 0.9386		Compariso	ns significan	t at the 0.05	level are in	ndicated by	/***/.	
	Cyperme	ethrin: Mysid	Life Cycle 10:49 Tue	esday, Jul	y 7, 1998		Co	TRT mparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneo Upper Confidenc Limit	us e	
	General	Linear Models	Procedure				IV	- II - III	-0.3778	0.0034	0.3845		
	TOT	MINCT	COLIS V LONCAN				IV	- V	-0.2853	0.1769	0.6391		
	IRI	LSMEA	n LSMEAN N Number				IV	- I	0.0781	0.4773	0.8765	***	
	I	7.9413733	0 1				II	- IV	-0.3845	-0.0034	0.3778		
	111	8.3875000	0 3				II	- V	-0.2917	0.1735	0.6388		
	Solvent	8.0674656	4 4 6 5 0 4					- I	0.0711	0.4739	0.8767	***	
	v Pr > IT	0.2472071)=ISMEAN(i)					- IV - II	-0.4602	-0.0279	0.4045		
	i/i 1 2 3 4 5 6					III	- V - Solvent	-0.3590	0.1490	0.6571			
	1 0.00	0.8616 0	.0005 0.3471	0.0592			ĪĪĪ	- I	-0.0021	0.4494	0.9009		
	3 0.0037 0.86	516 . 0 525 0.8283	.8283 0.0285	0.4121			v	- IV - II	-0.6391 -0.6388	-0.1769 -0.1735	0.2853		
	5 0.3471 0.00	0.0285 0	.0063 .	0.2497			Ň V	- III - Solvent	-0.6571	-0.1490	0.3590		
				•			v	- I	-0.1798	0.3004	0.7806		
	TRT	MW LSMEA	T LSMEAN N Number				Sol ven Sol ven	t - IV t - II	-0.7235 -0.7239	-0.3462 -0.3428	0.0312 0.0384		
	I	0,9098664	71				Sol ven Sol ven	t - III t - V	-0.7506 -0.6314	-0.3183 -0.1692	0.1141 0.2930		
	11 111	0.9703626 0.9531250	12 03				Solven	t - I	-0.2681	0.1311	0.5304		
	IV Solvent	0.9902408	1 4 4 5				I I	- IV - II	-0.8765 -0.8767	-0.4773 -0.4739	-0.0781 -0.0711	*** ***	
	v	0.8834866	5 6				I	- III - V	-0.9009 -0.7806	-0.4494 -0.3004	0.0021		
	Pr > T	HO: LSMEAN(i)=LSMEAN(j)				Ī	- Solvent	-0.5304	-0.1311	0.2681		
	i/j 1 1 0.13 2 0.1319 3 0.3353 0.60	2 3 319 0.3353 0 0.6900 0	4 5 .0441 0.6382 .5994 0.2699 3878 0.5664	6 0.5805 0.0626				Суре	ermethrin: Mysi	id Life Cyclo 10:49	e Tuesday, J	uly 7, 19	98
	4 0.0441 0.59	94 0.3878 0 0 5444 0	. 0.1020	0.0215				Gener	al Linear Mode	els Procedur	e		
	6 0.5805 0.06	26 0.1704 0	.0215 0.3302					Bonferroni	(Dunn) T tests	s for variab	le: MWT		
NOTE: To e with	nsure overall prot pre-planned compa	ection level, prisons should	only probabi be used.	lities as	sociated		NOTE:	This test con generally has all pairwise	trols the type a higher type comparisons.	e I experime e II error ra	ntwise erro ate than Tu	r rate bu key's for	it

Alpha= 0.05 Confidence= 0.95 df= 120 MSE= 0.018129

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Critical Value of T= 2.99510

Comparisons significant at the 0.05 level are indicated by '***'.

	TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit
IV	- II	-0.09298	0.01998	0.13294
IV	- III	-0.09088	0.03726	0.16540
IV	- Solvent	-0.04992	0.06192	0.17377
IV	- I	-0.03793	0.08038	0.19870
IV	- V	-0.03045	0.10654	0.24352
I I	- IV	-0.13294	-0.01998	0.09298
I I	- III	-0.11183	0.01728	0.14638
I I	- Solvent	-0.07102	0.04194	0.15490
I I	- I	-0.05897	0.06040	0.17977
I I	- V	-0.05134	0.08655	0.22445
	- IV	-0.16540	-0.03726	0.09088
	- II	-0.14638	-0.01728	0.11183
	- Solvent	-0.10347	0.02466	0.15280
	- I	-0.09070	0.04312	0.17695
	- V	-0.08130	0.06928	0.21986
Sol Sol Sol Sol	vent - IV vent - II vent - III vent - I vent - I vent - V	-0.17377 -0.15490 -0.15280 -0.09986 -0.09237	-0.06192 -0.04194 -0.02466 0.01846 0.04462	0.04992 0.07102 0.10347 0.13678 0.18160
I I I I	- IV - II - III - Solvent - V	-0.19870 -0.17977 -0.17695 -0.13678 -0.11616	-0.08038 -0.06040 -0.04312 -0.01846 0.02615	0.03793 0.05897 0.09070 0.09986 0.16847
V	- IV	-0.24352	-0.10654	0.03045
V	- II	-0.22445	-0.08655	0.05134
V	- III	-0.21986	-0.06928	0.08130
V	- Solvent	-0.18160	-0.04462	0.09237
V	- I	-0.16847	-0.02615	0.11616

Cypermethrin: Mysid Life Cycle 10:49 Tuesday, July 7, 1998

General Linear Models Procedure

Dunnett's One-tailed T tests for variable: MLNGTH

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 120 MSE= 0.206402 Critical Value of Dunnett's T= 2.281

Comparisons significant at the 0.05 level are indicated by *'***'*.

	TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
I V I I	- Solvent - Solvent	0.0588	0.3462 0.3428	0.6335 0.6330	
III	- Solvent	-0.0110	0.3183	0.6475	

File:44546035.c V - I -	ut Page 6 Solvent Solvent	-0.1827 -0.4351	0.1692 -0.1311	0.5212 0.1729	
	Cyperm	ethrin: Mysid	Life Cycle	asday July 7 10	08
	General	Linear Models	s Procedure	esuay, July 1, 17	70
Du	nnett's One-	tailed T tests	s for variable	e: MWT	
NOTE: Thi	s tests cont parisons of	rols the type all treatments	I experiment against a c	wise error for ontrol.	
Alpha=	0.05 Confi Critical	dence= 0.95 d Value of Dunne	df= 120 MSE= ett's T= 2.28	0.018129 1	
Comparisons	significant	at the 0.05 le	evel are indi	cated by '***'.	
TR Compa	T Irison	Simultaneous Lower [Confidence Limit	Sin Sifference Between Co Means	nultaneous Upper onfidence Limit	
IV - II - III - V -	Solvent Solvent Solvent Solvent Solvent	-0.02324 -0.04408 -0.07291 -0.10856 -0.14892	0.06192 0.04194 0.02466 0.01846 0.04462	0.14709 0.12795 0.12223 0.07163 0.05969	
	Cyperm	ethrin: Mysid	Life Cycle 10:49 Tu	esday, July 7, 19	98
	General	Linear Models	s Procedure		
Dependent Varia	ble: FLNGTH	Sum of	Maan		
Source	DF	Squares	Square	F Value Pr >	F
Model	6	6.6993357	1.1165560	5.00 0.00	01
Error	129	28.7980172	0.2232404		
Corrected Total	135	35.4973529			
	R-Square	c.v.	Root MSE	FLNGTH Me	an
*	0.188728	5.661474	0.4725	8.34	56
Source	DF	Type I SS	Mean Square	F Value Pr >	F
TRT REP	5 1	6.6972403 0.0020954	1.3394481 0.0020954	6.00 0.00 0.01 0.92	01 30
Source	DF	Type III SS	Mean Square	F Value Pr >	F
TRT REP	5 1 Cyperm	6.6496298 0.0020954 ethrin: Mysid	1.3299260 0.0020954 Life Cycle 10:49 Tu	5.96 0.00 0.01 0.92 esday, July 7, 19	01 30 98
	General	Linear Models	s Procedure		
Dependent Varia	ble: FWT				
Source	DF	Sum of Squares	Mean Square	F Value Pr >	F

File:44546035.out Model	Page 7 6	0.2557936	0.0426323	1.01	0.4240	File:44546035.out Page 8
Error	129	5.4642505	0.0423585			NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.
Corrected Total	.135	5.7200441				Oversetheins Musich Life Overla
	R-Square	c.v.	Root MSE		FWT Mean	Cypermethrin: Mysid Life Cycle 10:49 Tuesday, July 7, 195
	0 .0 44719	17.41781	0.2058		1.1816	General Linear Models Procedure
Source	DF	Type I SS	Mean Square	F Value	Pr > F	Bonferroni (Dunn) T tests for variable: FLNGTH
TRT REP	5 1	0.2518766	0.0503753 0.0039170	1.19 0.09	0.3180 0.7615	NOTE: This test controls the type I experimentwise error rate but generally has a higher type II error rate than Tukey's for all pairwise comparisons.
Source	DF	Type III SS	Mean Square	F Value	Pr > F	Alpha= 0.05 Confidence= 0.95 df= 129 MSE= 0.22324
TRT REP	5 1	0.2498377 0.0039170	0.0499675 0.0039170	1.18 0.09	0.3227 0.7615	Comparisons significant at the 0.05 level are indicated by '***'.
	Cyperme	ethrin: Mysid	Life Cycle 10:49 Tue	esday, Jul	y 7, 1998	Simultaneous Simultaneous Lower Difference Upper TRT Confidence Between Confidence Comparison Limit Means Limit
	General Le	Linear Models east Squares M	Procedure eans			IV - III -0.3076 0.1094 0.5265 IV - II -0.2773 0.1944 0.6662 IV - V - 0.0903 0.3726 0.9251
	TRT	FLNGT LSMEA	H LSMEAN N Number			IV - I -0.0253 0.4012 0.8277 IV - Solvent 0.2373 0.6674 1.0975 ***
	I II IV Solvent V	8.2461538 8.4527088 8.5375255 8.6475762 7.9807897 8.2746051	5 1 9 2 4 3 5 4 5 5 6 5 2 6			III - IV -0.5265 -0.1094 0.3076 III - II -0.3467 0.0850 0.5166 III - V -0.1478 0.2629 0.6737 III - I -0.0899 0.2918 0.6734 III - Solvent 0.1723 0.5579 0.9436 ***
	Pr > T	HO: LSMEAN(i)=LSMEAN(j)			II - IV -0.6662 -0.1944 0.2773 II - III -0.5166 -0.0850 0.3467 II - V -0.2882 0.1779 0.6441 V -0.2882 0.1779 0.6421
1 2 0.	0.16	0.0241 0 0.5578 0	.0056 0.0475 .2191 0.0019	0.8399		II - I0.2340 0.2068 0.6475 II - Solvent 0.0287 0.4729 0.9172 ***
3 0. 4 0. 5 0. 6 0.	.0241 0.55 .0056 0.21 .0475 0.00 .8399 0.25	978 . 0 91 0.4319 19 0.0001 0 53 0.0578 0	.4319 0.0001 0.0001 .0001 .0151 0.0409	0.0578 0.0151 0.0409		V - IV -0.8251 -0.3724 0.0803 V - III -0.6737 -0.2629 0.1478 V - II -0.6441 -0.1779 0.2882 V - I -0.3915 0.0288 0.4491 V - Solvent -0.1289 0.2950 0.7189
	TRT I	FW LSMEA 1.1676923 1.2473764	T LSMEAN N Number 1 1 1 2			$ \begin{array}{cccccccccccccccccccccccccccccccccccc$
	III IV Solvent V	1.1660757 1.2418211 1.1789202 1.1125399	6 3 1 4 0 5 0 6			Solvent IV -1.0975 -0.6674 -0.2373 **** > Solvent III -0.9436 -0.5579 -0.1723 **** > Solvent III -0.9172 -0.4729 -0.0287 **** > Solvent V -0.7189 -0.2950 0.1289 - -
	Pr > T	HO: LSMEAN(i)=LSMEAN(j)			Solvent - I -0.6620 -0.2662 0.1297
i/j 1 . 2 0. 3 0. 4 0. 5 0.	1 .2168 .9769 0.19 .2350 0.93 .8462 0.29 .3695 0.04	2 3 68 0.9769 0 0.1983 0 83 0 57 0.2152 32 0.8203 0 92 0.3725 0	4 5 .2350 0.8462 .9357 0.2932 .2152 0.8203 . 0.3176 .3176 . .0523 0.2861	6 0.3695 0.0492 0.3725 0.0523 0.2861		Cypermethrin: Mysid Life Cycle 10:49 Tuesday, July 7, 199 General Linear Models Procedure Bonferroni (Dunn) T tests for variable: FWT

0.0253 0.0899 0.2340 0.3915 0.6620 **** B these treatment **** B means are larger than the Solvent control -0.2373 -0.1723 -0.0287 0.1289 0.1297

|File:44546035.out Page 9

NOTE: This test controls the type I experimentwise error rate but generally has a higher type II error rate than Tukey's for all pairwise comparisons.

Alpha= 0.05 Confidence= 0.95 df= 129 MSE= 0.042359 Critical Value of T= 2.99085

Comparisons significant at the 0.05 level are indicated by '***'.

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit
II - IV	-0.20055	0.00495	0.21045
II - Solvent	-0.12645	0.06706	0.26057
II - I	-0.11263	0.07937	0.27136
II - III	-0.10649	0.08154	0.26957
II - V	-0.06800	0.13506	0.33812
IV - II	-0.21045	-0.00495	0.20055
IV - Solvent	-0.12524	0.06211	0.24945
IV - I	-0.11137	0.07441	0.26020
IV - III	-0.10509	0.07659	0.25827
IV - V	-0.06709	0.13011	0.32730
Solvent - II	-0.26057	-0.06706	0.12645
Solvent - IV	-0.24945	-0.06211	0.12524
Solvent - I	-0.16011	0.01231	0.18473
Solvent - III	-0.15351	0.01448	0.18248
Solvent - V	-0.11667	0.06800	0.25267
I - 1I	-0.27136	-0.07937	0.11263
I - IV	-0.26020	-0.07441	0.11137
I - Solvent	-0.18473	-0.01231	0.16011
I - III	-0.16407	0.00218	0.16842
I - V	-0.12739	0.05569	0.23877
III - II	-0.26957	-0.08154	0.10649
III - IV	-0.25827	-0.07659	0.10509
III - Solvent	-0.18248	-0.01448	0.15351
III - I	-0.16842	-0.00218	0.16407
III - V	-0.12540	0.05352	0.23243
V - II	-0.33812	-0.13506	0.06800
V - IV	-0.32730	-0.13011	0.06709
V - Solvent	-0.25267	-0.06800	0.11667
V - I	-0.23877	-0.05569	0.12739
V - III	-0.23243	-0.05352	0.12540

Cypermethrin: Mysid Life Cycle 10:49 Tuesday, July 7, 1998

General Linear Models Procedure

Dunnett's One-tailed T tests for variable: FLNGTH

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 129 MSE= 0.22324 Critical Value of Dunnett's T= 2.268

Comparisons significant at the 0.05 level are indicated by '***'.

Simultaneous Simultaneous Lower Difference Upper

le:4454603 C	35.out Page 10 TRT omparison	Confidence Limit	Between Means	Confidence Limit
IV III II V	- Solvent - Solvent - Solvent - Solvent	0.3412 0.2655 0.1361 -0.0265	0.6674 0.5579 0.4729 0.2950	0.9935 0.8504 0.8098 0.6165
Î	- Solvent	-0.0340	0.2662	0.5663

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Cypermethrin: Mysid Life Cycle 10:49 Tuesday, July 7, 1998

General Linear Models Procedure

Dunnett's One-tailed T tests for variable: FWT

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 129 MSE= 0.042359 Critical Value of Dunnett's T= 2.268

Comparisons significant at the 0.05 level are indicated by '***'.

	TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit
II	- Solvent	-0.07969	0.06706	0.21381
IV	- Solvent	-0.07997	0.06211	0.20418
I	- Solvent	-0.14307	-0.01231	0.11845
III	- Solvent	-0.14188	-0.01448	0.11292
V	- Solvent	-0.20804	-0.06800	0.07204

ANALYSIS USING	TRT*REP	INTERACTION	AS THE	ERROR	TERM	
			10:49	Tuesday	/, July 7,	1998

General Linear Models Procedure Class Level Information

Class	Levels	Values
REP	2	AB

TRT 6 I II III IV Solvent V

Number of observations in data set = 155

Group Obs Dependent Variables

- 1 127 MLNGTH MWT
- 2 136 FLNGTH FWT

NOTE: Variables in each group are consistent with respect to the presence or absence of missing values.

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM 10:49 Tuesday, July 7, 1998

General Linear Models Procedure

Dependent Variable: MLNGTH

File:44546035.out	: Page 11	Cum of	Maaa		
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	4.9856329	0.4532394	2.14	0.0229
Error	115	24.4061781	0.2122276		
Corrected Total	126	29.3918110			
	R-Square	C.V.	Root MSE	MLNG	TH Mean
	0 .169 627	5.588554	0.4607		8.2433
Source	DF	Type I SS	Mean Square	F Value	Pr > F
REP	1	0.0526606	0.0526606	0.25	0.6193
REP*TRT	5	4.5709329 0.3620394	0.9141866 0.0724079	4.31 0.34	0.0013 0.8870
Source	DF	Type III SS	Mean Square	F Value	Pr > F
REP	1	0.0985641	0.0985641	0.46	0.4969
REP*TRT	5	0.3620394	0.0724079	0.34	0.8870
Tests of Hypothes	es using th	ne Type III MS	for REP*TRT	as an error	term
Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	S USING TRI	4.3189703 *REP INTERACT	0.8637941 ION AS THE ER 10:49 Tue	11.93 ROR TERM esday, July	0.0083 7, 1998
1					-
	General	Linear Models	Procedure		
Dependent Variabl	General e: MWT	Linear Models	Procedure		
Dependent Variabl Source	G en eral e: MWT DF	Linear Models Sum of Squares	Procedure Mean Square	F Value	Pr > F
Dependent Variabl Source Model	General e: MWT DF 11	Linear Models Sum of Squares 0.1688431	Procedure Mean Square 0.0153494	F Value 0.82	Pr > F 0.6225
Dependent Variabl Source Model Error	General e: MWT DF 11 115	Linear Models Sum of Squares 0.1688431 2.1589301	Procedure Mean Square 0.0153494 0.0187733	F Value 0.82	Pr > F 0.6225
Dependent Variabl Source Model Error Corrected Total	General e: MWT DF 11 115 126	Linear Models Sum of Squares 0.1688431 2.1589301 2.3277732	Procedure Mean Square 0.0153494 0.0187733	F Value 0.82	Pr > F 0.6225
Dependent Variabl Source Model Error Corrected Total	General e: MWT DF 11 115 126 R-Square	Linear Models Sum of Squares 0.1688431 2.1589301 2.3277732 C.V.	Procedure Mean Square 0.0153494 0.0187733 Root MSE	F Value 0.82 M	Pr > F 0.6225 WT Mean
Dependent Variabl Source Model Error Corrected Total	General e: MWT DF 11 115 126 R-Square 0.072534	Linear Models Sum of Squares 0.1688431 2.1589301 2.3277732 C.V. 14.50083	Procedure Mean Square 0.0153494 0.0187733 Root MSE 0.1370	F Value 0.82 M	Pr > F 0.6225 WT Mean 0.9449
Dependent Variabl Source Model Error Corrected Total Source	General e: MWT DF 11 115 126 R-Square 0.072534 DF	Linear Models Squares 0.1688431 2.1589301 2.3277732 C.V. 14.50083 Type I SS	Procedure Mean Square 0.0153494 0.0187733 Root MSE 0.1370 Mean Square	F Value 0.82 M	Pr > F 0.6225 WT Mean 0.9449 Pr > F
Dependent Variabl Source Model Error Corrected Total Source REP	General e: MWT DF 11 115 126 R-Square 0.072534 DF 1 5	Linear Models Sum of Squares 0.1688431 2.1589301 2.3277732 C.V. 14.50083 Type I SS 0.0000229 0.1522765	Procedure Mean Square 0.0153494 0.0187733 Root MSE 0.1370 Mean Square 0.0000229 0.030655	F Value 0.82 M F Value 0.00	Pr > F 0.6225 WT Mean 0.9449 Pr > F 0.9722 0.1596
Dependent Variabl Source Model Error Corrected Total Source REP TRT REP*TRT	General e: MWT DF 11 115 126 R-Square 0.072534 DF 1 5 5	Linear Models Squares 0.1688431 2.1589301 2.3277732 C.V. 14.50083 Type I SS 0.0000229 0.1522765 0.0165437	Procedure Mean Square 0.0153494 0.0187733 Root MSE 0.1370 Mean Square 0.0000229 0.0304553 0.0033087	F Value 0.82 M F Value 0.00 1.62 0.18	Pr > F 0.6225 WT Mean 0.9449 Pr > F 0.9722 0.1596 0.9710
Dependent Variabl Source Model Error Corrected Total Source REP TRT REP*TRT Source	General e: MWT DF 11 115 126 R-Square 0.072534 DF 1 5 5 DF	Linear Models Sum of Squares 0.1688431 2.1589301 2.3277732 C.V. 14.50083 Type I SS 0.0000229 0.1522765 0.0165437 Type III SS	Procedure Mean Square 0.0153494 0.0187733 Root MSE 0.1370 Mean Square 0.0000229 0.0304553 0.0033087 Mean Square	F Value 0.82 F Value 0.00 1.62 0.18 F Value	Pr > F 0.6225 WT Mean 0.9449 Pr > F 0.9722 0.1596 0.9710 Pr > F
Dependent Variabl Source Model Error Corrected Total Source REP TRT REP*TRT Source REP TRT	General e: MWT DF 11 115 126 R-Square 0.072534 DF 1 5 5 DF 1 5	Linear Models Sum of Squares 0.1688431 2.1589301 2.3277732 C.V. 14.50083 Type I SS 0.0000229 0.1522765 0.0165437 Type III SS 0.0000001 0.1209045	Procedure Mean Square 0.0153494 0.0187733 Root MSE 0.1370 Mean Square 0.0000229 0.0304553 0.0033087 Mean Square 0.0000001 0.0258580	F Value 0.82 M F Value 0.00 1.62 0.18 F Value 0.00 1.38	Pr > F 0.6225 WT Mean 0.9449 Pr > F 0.9722 0.1596 0.9710 Pr > F 0.9984 0.2379
Dependent Variabl Source Model Error Corrected Total Source REP TRT REP*TRT Source REP TRT REP*TRT	General e: MWT DF 11 115 126 R-Square 0.072534 DF 15 5 DF	Linear Models Sum of Squares 0.1688431 2.1589301 2.3277732 C.V. 14.50083 Type I SS 0.0000229 0.1522765 0.0165437 Type III SS 0.000001 0.1292945 0.0165437	Procedure Mean Square 0.0153494 0.0187733 Root MSE 0.1370 Mean Square 0.0000229 0.0304553 0.0033087 Mean Square 0.000001 0.0258589 0.0033087	F Value 0.82 F Value 0.00 1.62 0.18 F Value 0.00 1.38 0.18	Pr > F 0.6225 WT Mean 0.9449 Pr > F 0.9722 0.1596 0.9710 Pr > F 0.9984 0.2379 0.9710
Dependent Variabl Source Model Error Corrected Total Source REP TRT REP*TRT Source REP TRT REP*TRT Tests of Hypothes	General e: MWT DF 11 115 126 R-Square 0.072534 DF 1 5 5 DF 1 5 5 es using th	Linear Models Sum of Squares 0.1688431 2.1589301 2.3277732 C.V. 14.50083 Type I SS 0.0000229 0.1522765 0.0165437 Type III SS 0.0000001 0.1292945 0.0165437 ne Type III MS	Procedure Mean Square 0.0153494 0.0187733 Root MSE 0.1370 Mean Square 0.0000229 0.0304553 0.0033087 Mean Square 0.000001 0.0258589 0.0033087 for REP*TRT	F Value 0.82 F Value 0.00 1.62 0.18 F Value 0.00 1.38 0.18 as an error	Pr > F 0.6225 WT Mean 0.9449 Pr > F 0.9722 0.1596 0.9710 Pr > F 0.9984 0.2379 0.9710 term
Dependent Variabl Source Model Error Corrected Total Source REP TRT REP*TRT Source REP TRT REP*TRT Tests of Hypothes Source	General e: MWT DF 11 115 126 R-Square 0.072534 DF 1 5 5 DF 1 5 5 es using th DF	Linear Models Sum of Squares 0.1688431 2.1589301 2.3277732 C.V. 14.50083 Type I SS 0.0000229 0.1522765 0.0165437 Type III SS 0.000001 0.1292945 0.0165437 type III SS Type III SS	Procedure Mean Square 0.0153494 0.0187733 Root MSE 0.1370 Mean Square 0.0000229 0.0304553 0.0033087 Mean Square 0.0000001 0.0258589 0.0033087 for REP*TRT Mean Square	F Value 0.82 F Value 0.00 1.62 0.18 F Value 0.00 1.38 0.18 as an error F Value	Pr > F 0.6225 WT Mean 0.9449 Pr > F 0.9722 0.1596 0.9710 Pr > F 0.9984 0.2379 0.9710 term Pr > F

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ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM 10:49 Tuesday, July 7, 1998

General Linear Models Procedure Least Squares Means

Standard Errors and Probabilities calculated using the Type III MS for REP*TRT as an Error term

TRT	MLNO	ATH LS	MEAN mber	
I II IV Solvent V	7.952777 8.412820 8.387500 8.420606 8.074404 8.262500	778 051 000 606 676 000	1 2 3 4 5 6	
Pr > T H	0: LSMEAN((i)=LSME	AN(j)	
i/j 1 2 1 0.0022 2 0.0022	3 0.0047 0.7807	4 0.0021 0.9222	5 0.1866 0.0065	6 0.0272 0.1825

_	0.0022		0.1001		0.0005	0.1025
3	0 00/7	0 7807		0 7158	0 01//6	0 2880
	0.004/	0.7007	•	0.7150	0.0140	0.2000
1.	0 0021	0 0222	0 7158		0 0058	0 1637
-	0.0021	0.7666	0.7120		0,0000	0.1037
5	0 1944	0 0045	0 01/4	0 0059		0 1002
<u> </u>	0.1000	0.0005	0.0140	0.0030	•	0.1072
	0 0 7 7 7 7	0 1005	0 2000	A 4/77	0 1000	
•	0.0272	0.1022	0.2000	0.103/	0.1092	

Standard Errors and Probabilities calculated using the Type III MS for REP*TRT as an Error term

LSMEAN	Number
0.91166667 0.97067308 0.95312500 0.98730303 0.92839286 0.88763889	1 2 3 4 5 6
	LSMEAN 0.91166667 0.97067308 0.95312500 0.98730303 0.92839286 0.88763889

Pr > |T| HO: LSMEAN(i)=LSMEAN(j)

i/	i 1	2	3	4	5	6
1	• .	0.0183	0.0830	0.0068	0.3702	0.3133
2	0.0183	•	0.3845	0.3521	0.0471	0.0103
3	0.0830	0.3845		0.1218	0.2344	0.0333
4	0.0068	0.3521	0.1218		0.0145	0.0048
5	0.3702	0.0471	0.2344	0.0145		0.1055
6	0.3133	0.0103	0.0333	0.0048	0.1055	

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM 10:49 Tuesday, July 7, 1998

General Linear Models Procedure

Dunnett's One-tailed T tests for variable: MLNGTH

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 5 MSE= 0.072408

File:44546035.ou	t Page 13 Critical	Value of Dunr	nett's T= 3.	025	
Comparisons s	ignificant	at the 0.05 l	evel are in	dicated by '*	**'.
TR1 Compar	ison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
IV - II - III - V - I -	Solvent Solvent Solvent Solvent Solvent	0.12036 0.11473 0.05959 -0.10731 -0.36999	0.34615 0.34277 0.31827 0.16923 -0.13114	0.57194 0.57081 0.57695 0.44577 0.10772	
ANALYS	IS U sin g tr	T*REP INTERAC	TION AS THE 10:49	ERROR TERM Tuesday, July	7, 1998
	General	Linear Model	s Procedure		
Dun	nett's One-	tail <mark>e</mark> d T test	s for varial	ole: MWT	
NOTE: This comp	tes ts cont aris on s of a	rols the type all treatment	l experimen s against a	ntwise error control.	for
Alpha=	0.05 Conf Critical	idence= 0.95 Value of Dunn	df= 5 MSE= ett's T= 3.0	= 0.003309)25	
Comparisons s	ignificant	at the 0.05 l	evel are ind	dicated by '*	**'.
TRT Compar	ison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
IV - II - III - V -	Solvent Solvent Solvent Solvent Solvent	0.01366 -0.00681 -0.03063 -0.06952 -0.10373	0.06192 0.04194 0.02466 -0.01846 -0.04462	0.11019 0.09069 0.07996 0.03260 0.01450	
ANALYS	IS U SIN G TR'	T*REP INTERAC	TION AS THE 10:49 1	ERROR TERM uesday, July	7, 1998
	General	Linear Model	s Procedure		
Dependent Variab Source	le: FLNGTH DF	Sum of Squares	Mea Squar	an °e FValue	Pr > F
lodel	11	10.084365	0.91676	60 4.47	0.0001
Error	124	25.412988	0.20494	3	
Corrected Total	135	35.497353			
	R-Square	c.v.	Root MS	E FLN	GTH Mean
	0.284088	5.424504	0.452	27	8.3456
Source	DF	Type I SS	Mean Squar	e F Value	Pr > F
₹EP ſRT REP*TRT	1 5 5	0.0497059 6.6496298 3.3850297	0.049705	9 0.24 0 6.49	0.6233 0.0001 0.0078

and the second

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File:44546035.out Source	Page 14 DF	Type III SS	Mean Square	F Value	Pr > F	
REP	1	0.0764611	0.0764611	0.37	0.5424	
REP*TRT	5	7.4738595 3.3850297	1.4947719 0.6770059	7.29	0.0001 0.0078	
Tests of Hypothes	es using th	e Type III MS	for REP*TRT	as an erro	or term	
Source	DF	Type III SS	Mean Square	F Value	Pr > F	
TRT ANALYSI	S USING TRT	7.4738595 *REP INTERACT	1.4947719 ION AS THE EF 10-49 Tue	2.21 RROR TERM	0.2025	
	General	Linear Models	Procedure	sudy, buty	(, ())0	
Dependent Variabl	e: FWT					
Source	DF	Sum of Squares	Mean Square	F Value	Pr > F	
Model	11	0.4178279	0.0379844	0.89	0.5537	
Error	124	5.3022162	0.0427598			
Corrected Total	135	5.7200441				
	R-Square	c.v.	Root MSE		FWT Mean	
	0.073046	17.50012	0.2068		1.1816	
Source	DF	Type I SS	Mean Square	F Value	Pr > F	
REP TRT REP*TRT	1 5 5	0.0059559 0.2498377 0.1620343	0.0059559 0.0499675 0.0324069	0.14 1.17 0.76	0.7096 0.3284 0.5819	
Source	DF	Type III SS	Mean Square	F Value	Pr > F	
REP	1	0.0001678	0.0001678	0.00	0.9502	
TRT REP*TRT	5 5	0.2544060 0.1620343	0.0508812 0.0324069	1.19 0.76	0.3180 0.5819	
Tests of Hypothes	es using th	e Type III MS	for REP*TRT	as an erro	r term .	
Source	DF	Type III SS	Mean Square	F Value	Pr > F	
TRT	5	0.2544060	0.0508812	1.57	0.3163	
ANALYSI	S USING TRT	*REP INTERACT	ION AS THE EF 10:49 Tue	ROR TERM esday, July	7, 1998	
General Linear Models Procedure						
Standard Errors a	nd Probabil REP*	ities calcula TRT as an Erro	ted using the	e Type III	MS for	
	TRT	FLNGT LSMEA	H LSMEAN N Number			
	I I I	8.2461538 8.4500000	5 1 0 2			
		8.5596153	B 3 6 4			
	Solvent V	7.9516666 8.2520202	75 06			

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3 4 5

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Pr > |T| HO: LSMEAN(i)=LSMEAN(j) 5 i/j 1 2 3 4

	0.4635	0.2185	0.1604	0.2618	0.9819
0.4635	-	0.6818	0.4886	0.1146	0.4998
0.2185	0.6818		0 7099	0 0443	0 2569
0 160%	0 6886	0 7000	0110//	0 0397	0 1875
0.7449	0.4000	0.7077	0'0707	0.0501	0.1075
0.2010	0.1140	0.0445	0.0307		0.2031
0.9819	0.4998	0.2569	0.1875	0.2831	•

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Standard Errors and Probabilities calculated using the Type III MS for REP*TRT as an Error term

TRT	FWT LSMEAN	LSMEAN Number
I II IV Solvent V	1.16769231 1.24409722 1.16788462 1.24122222 1.16933333 1.10787879	1 2 3 4 5 6

Pr > |T| HO: LSMEAN(i)=LSMEAN(j)

i/	j 1	2	3	4	5	6
1		0.2321	0.9970	0.2342	0.9756	0.3160
2	0.2321		0.2256	0.9638	0.2475	0.0710
3	0.9970	0.2256		0.2272	0.9779	0.3056
4	0.2342	0.9638	0.2272		0.2505	0.0694
5	0.9756	0.2475	0.9779	0.2505		0.3119
5	0.3160	0.0710	0.3056	0.0694	0.3119	

NOTE: To ensure overall protection level, only probabilities associated with pre-planned comparisons should be used.

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM 10:49 Tuesday, July 7, 1998

General Linear Models Procedure

Dunnett's One-tailed T tests for variable: FLNGTH

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 5 MSE= 0.677006 Critical Value of Dunnett's T= 3.001

Comparisons significant at the 0.05 level are indicated by '***'.

TRT Comparison		Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit
IV	- Solvent	-0.0841	0.6674	1.4189
III	- Solvent	-0.1159	0.5579	1.2318
II	- Solvent	-0.3033	0.4729	1.2491
V	- Solvent	-0.4457	0.2950	1.0357
I	- Solvent	-0.4255	0.2662	0.9578

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM 10:49 Tuesday, July 7, 1998

General Linear Models Procedure

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Dunnett's One-tailed T tests for variable: FWT

NOTE: This tests controls the type I experimentwise error for comparisons of all treatments against a control.

Alpha= 0.05 Confidence= 0.95 df= 5 MSE= 0.032407 Critical Value of Dunnett's T= 3.001

Comparisons significant at the 0.05 level are indicated by '***'.

	TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit
II	- Solvent	-0.10276	0.06706	0.23688
IV	- Solvent	-0.10231	0.06211	0.22652
I	- Solvent	-0.16363	-0.01231	0.13901
III	- Solvent	-0.16192	-0.01448	0.13295
V	- Solvent	-0.23007	-0.06800	0.09407