MRID No. 445460-35

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

1. **CHEMICAL:** Cypermethrin   **PC Code No.:** 109702

2. **TEST MATERIAL:** $[^{14}C]\beta$-Cypermethrin   **Radiopurity:** >95%

3. **CITATION:**

Authors:	Joseph V. Sousa
Title:	$[^{14}C]\beta$-Cypermethrin - Chronic Toxicity to Mysids (*Mysidopsis bahia*) Under Flow-Through Conditions
Study Completion Date:	January 26, 1998
Laboratory:	Springborn Laboratories, Inc., Wareham, MA
Sponsor:	ELF Atochem North America, Philadelphia, PA
Laboratory Report ID:	97-12-7170
MRID No.:	445460-35
DP Barcode:	D246502

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

   Signature: *Karl Bullock*   **Date:** 7/22/98

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

   Signature: *P. Kosalwat*   **Date:** 7/22/98

5. **APPROVED BY:**

   Signature: *M. Rexrode*   **Date:** 3/10/03

6. **STUDY PARAMETERS:**

Age of Test Organism:	≤24 hours
Definitive Test Duration:	28 days
Study Method:	Flow-Through
Type of Concentrations:	Mean Measured

7. **CONCLUSIONS:** 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

<u>Most sensitive endpoint</u>: Survival and Reproduction

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

<u>LOEC's for specific effects</u>

Young/Female
Reproductive Day: 3.3 ng/L
Survival: 3.3 ng/L
Male length: >3.3 ng/L >1.5
Female length: >3.3 ng/L >1.5
Male dry weight: >3.3 ng/L >1.5
Female dry weight: >3.3 ng/L >1.5

8. **ADEQUACY OF THE STUDY:**

   A. **Classification:** Core.

   B. **Rationale:** Fulfills the guideline requirements.

   C. **Repairability:** N/A.

9. **MAJOR GUIDELINE DEVIATIONS:** 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:**

   A. **Biological System:**

Guideline Criteria	Reported Information
Species: An estuarine shrimp species, preferably *Mysidopsis bahia*	*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. 2) Mysids should be in good health.	1. Parental stock was maintained in the dilution water at test temperature. 2. Yes
Parental Acclimation Period At least 14 days	$\geq$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 1st 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.
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.	Mysids were obtained from in-house cultures maintained for at least 14 days, in dilution water at test temperature.

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. **No. of mysids after pairing:** ≥ 20 randomly selected pairs/treatment (excess males should be held in separate compartment to replace paired males).	**Before pairing:** 15 mysids/compartment; 2 compartments/test chamber; 2 replicate chambers/ treatment (60 mysids/level). **After pairing:** 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 after test initiation). 2) Should be paired on the same day.	1. Pairing was conducted when the mysids reached sexual maturation. 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. Live young must be counted and removed daily. Missing or impinged animals should be recorded.	Number of surviving mysids were counted at test initiation and at 24 hour intervals. Live young were counted and removed daily beginning on Day 15 (the first day that young were present). Dead mysids were removed when observed.

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. Physical System:

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. 2) During the test, salinity should be measured daily and the difference between highest and lowest must be less than 10 g/kg. 3) pH should be measured at the beginning, end of test and weekly. Measured values should be between 7.6 and 8.2, and not deviate by more than one unit for more than 48 hours. 4) DO must be measured at each conc. at least once a week. (see details in ASTM)	1. Artificial seawater prepared by the addition of a commercially prepared salt formula (hw-MARINEMIX®) to soft freshwater, filtered through a 10-μm filter and adjusted to a salinity of 25 ± 3‰. The artificial seawater was aerated vigorously and screened for contaminants. 2. Salinity measured daily in each replicate was between 23 and 28‰ during the test. 3. pH measured daily in each replicate was between 8.0 and 8.4 during the test. 4. DO measured daily in each replicate was maintained at $\geq$74% of saturation throughout the test.

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Guideline Criteria	Reported Information
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.	1) Mean measured temperature for each chamber at test termination was 26°C, within one degree of the selected test temperature (25°C). 2) 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. 3) 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; 2) Aeration should not be used for mixing; 3) It must be demonstrated that the test solution is completely mixed before intro. into the test system; 4) Flow splitting accuracy must be within 10%.	1. Not reported. 2. Not reported. 3. Chemical analysis of test solutions resulted in mean recoveries ranging from 51 - 58% of nominal concentrations. 4. Not reported.

Guideline Criteria	Reported Information
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.	1. Glass 2. 39 X 20 X 25 cm with a solution volume fluctuating between 4 and 7 L. 3. 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. 2) Flow-through: Openings in the test compartments should be covered with nylon mesh or stainless steel screen.	1. N/A 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. 2) Flow rate must maintain DO at or above 60% of saturation and maintain the toxicant level. 3) Meter systems calibrated before study and checked twice daily during test period.	1. 7.0 volume additions/24 hours 2. DO maintained at $\geq$74% of saturation. Toxicant concentration was maintained between 51 and 58% of nominal concentrations. 3. Yes
Aeration: 1) Dilution water should be aerated to insure DO concentration at or near 100% saturation. 2) Test tanks may be aerated.	1. Dilution water was aerated prior to use. 2. No aeration was necessary in the test vessels.

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C. **Chemical System:**

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

Comments: None.

11. **REPORTED RESULTS:**

Guideline Criteria	Reported Information
Quality assurance and GLP compliance statements were included in the report?	Yes
1) At least 75% of the paired 1st generation females in the control produced young or 2) The average number of young produced by the 1st generation females in the control(s) was more than 3.	1. Yes 2. 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

Effects Data:

Toxicant Concentration (ng/l)		Survival	Number of Young per Female Repro. Day	Mean Total Length (mm)		Mean Dry Weight (mg)	
Nom.	Meas.	♂ & ♀[a]		♂	♀	♂	♀
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.

12. **REVIEWER'S STATISTICAL RESULTS**:

Endpoint	Method	NOEC (ng/L)	LOEC (ng/L)
Survival	Williams'	1.5	3.3
# Young/female	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

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

13. **REVIEWER'S CONCLUSIONS**: 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 (Isotonic regression model)   TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Solvent Control	2	0.850	1.178	1.178
2	0.21	2	0.780	1.085	1.085
3	0.44	2	0.700	0.991	1.031
4	0.79	2	0.750	1.049	1.031
5	1.5	2	0.750	1.052	1.031
6	3.3	2	0.550	0.836	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   (Isotonic regression model)   TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Solvent Control	2	0.835	1.158	1.158
2	0.21	2	0.675	0.965	1.016
3	0.44	2	0.735	1.038	1.016
4	0.79	2	0.745	1.043	1.016
5	1.5	2	0.700	0.995	0.995
6	3.3	2	0.340	0.622	0.622

Cypermethrin: Chronic Daphnid - #young/fem rep day
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	1.158				
0.21	1.016	1.322		1.94	k= 1, v= 6
0.44	1.016	1.322		2.06	k= 2, v= 6
0.79	1.016	1.322		2.10	k= 3, v= 6
1.5	0.995	1.517		2.12	k= 4, v= 6
3.3	0.622	4.979	*	2.13	k= 5, v= 6

s =   0.108
Note: df used for table values are approximate when v > 20.

Cypermethrin: Mysid Life Cycle
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--------------------------------- TRT=I ---------------------------------

Variable	N	Mean	Std Dev	Minimum	Maximum
MLNGTH	21	7.9380952	0.6208673	7.0000000	8.8000000
FLNGTH	26	8.2461538	0.4178332	7.3000000	9.1000000
MWT	21	0.9100000	0.1319091	0.6500000	1.1200000
FWT	26	1.1676923	0.1543323	0.9000000	1.4800000

--------------------------------- TRT=II ---------------------------------

Variable	N	Mean	Std Dev	Minimum	Maximum
MLNGTH	25	8.4120000	0.3865661	7.5000000	8.9000000
FLNGTH	17	8.4529412	0.4797364	7.4000000	9.3000000
MWT	25	0.9704000	0.1636938	0.6400000	1.2500000
FWT	17	1.2470588	0.2306991	0.8500000	1.6500000

--------------------------------- TRT=III ---------------------------------

Variable	N	Mean	Std Dev	Minimum	Maximum
MLNGTH	16	8.3875000	0.3757215	7.4000000	9.3000000
FLNGTH	29	8.5379310	0.4483412	7.4000000	9.3000000
MWT	16	0.9531250	0.0953393	0.7900000	1.1500000
FWT	29	1.1655172	0.1984689	0.8300000	1.6000000

--------------------------------- TRT=IV ---------------------------------

Variable	N	Mean	Std Dev	Minimum	Maximum
MLNGTH	26	8.4153846	0.3402262	7.7000000	8.9000000
FLNGTH	19	8.6473684	0.3849508	7.7000000	9.4000000
MWT	26	0.9903846	0.1320449	0.7500000	1.3700000
FWT	19	1.2421053	0.1876930	0.8500000	1.4500000

--------------------------------- TRT=Solvent ---------------------------------

Variable	N	Mean	Std Dev	Minimum	Maximum
MLNGTH	26	8.0692308	0.4913404	7.0000000	8.8000000
FLNGTH	25	7.9800000	0.4778424	7.2000000	8.7000000
MWT	26	0.9284615	0.1336471	0.6500000	1.2200000
FWT	25	1.1800000	0.2237186	0.7900000	1.7900000

--------------------------------- TRT=V ---------------------------------

Variable	N	Mean	Std Dev	Minimum	Maximum
MLNGTH	13	8.2384615	0.4555920	7.4000000	8.9000000
FLNGTH	20	8.2750000	0.6060007	7.0000000	9.4000000
MWT	13	0.8838462	0.1175116	0.7000000	1.0600000
FWT	20	1.1120000	0.2387379	0.7700000	1.6700000

Cypermethrin: Mysid Life Cycle

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General Linear Models Procedure
Class Level Information

Class	Levels	Values
TRT	6	I II III IV Solvent V
REP	2	A B

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.

Cypermethrin: Mysid Life Cycle
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General Linear Models Procedure

Dependent Variable: MLNGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	4.6235935	0.7705989	3.73	0.0019
Error	120	24.7682175	0.2064018		
Corrected Total	126	29.3918110			

R-Square	C.V.	Root MSE	MLNGTH Mean
0.157309	5.511316	0.4543	8.2433

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	4.5583872	0.9116774	4.42	0.0010
REP	1	0.0652063	0.0652063	0.32	0.5751

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	4.5709329	0.9141866	4.43	0.0010
REP	1	0.0652063	0.0652063	0.32	0.5751

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General Linear Models Procedure

Dependent Variable: MWT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	0.1522994	0.0253832	1.40	0.2201
Error	120	2.1754739	0.0181289		
Corrected Total	126	2.3277732			

	R-Square		C.V.	Root MSE		MWT Mean
	0.065427		14.24980	0.1346		0.9449

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	0.1521912	0.0304382	1.68	0.1448
REP	1	0.0001082	0.0001082	0.01	0.9386

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	0.1522765	0.0304553	1.68	0.1446
REP	1	0.0001082	0.0001082	0.01	0.9386

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General Linear Models Procedure
Least Squares Means

TRT	MLNGTH LSMEAN	LSMEAN Number
I	7.94137330	1
II	8.41291786	2
III	8.38750000	3
IV	8.41891484	4
Solvent	8.06746566	5
V	8.24728710	6

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

i/j	1	2	3	4	5	6
1	.	0.0006	0.0037	0.0005	0.3471	0.0592
2	0.0006	.	0.8616	0.9625	0.0077	0.2904
3	0.0037	0.8616	.	0.8283	0.0285	0.4121
4	0.0005	0.9625	0.8283	.	0.0063	0.2692
5	0.3471	0.0077	0.0285	0.0063	.	0.2497
6	0.0592	0.2904	0.4121	0.2692	0.2497	.

TRT	MWT LSMEAN	LSMEAN Number
I	0.90986647	1
II	0.97036261	2
III	0.95312500	3
IV	0.99024081	4
Solvent	0.92853344	5
V	0.88348665	6

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

i/j	1	2	3	4	5	6
1	.	0.1319	0.3353	0.0441	0.6382	0.5805
2	0.1319	.	0.6900	0.5994	0.2699	0.0626
3	0.3353	0.6900	.	0.3878	0.5666	0.1704
4	0.0441	0.5994	0.3878	.	0.1020	0.0215
5	0.6382	0.2699	0.5666	0.1020	.	0.3302
6	0.5805	0.0626	0.1704	0.0215	0.3302	.

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

Cypermethrin: Mysid Life Cycle

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General Linear Models Procedure

Bonferroni (Dunn) T tests for variable: MLNGTH

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= 120 MSE= 0.206402
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	-0.3778	0.0034	0.3845	
IV	- III	-0.4045	0.0279	0.4602	
IV	- V	-0.2853	0.1769	0.6391	
IV	- Solvent	-0.0312	0.3462	0.7235	
IV	- I	0.0781	0.4773	0.8765	***
II	- IV	-0.3845	-0.0034	0.3778	
II	- III	-0.4111	0.0245	0.4601	
II	- V	-0.2917	0.1735	0.6388	
II	- Solvent	-0.0384	0.3428	0.7239	
II	- I	0.0711	0.4739	0.8767	***
III	- IV	-0.4602	-0.0279	0.4045	
III	- II	-0.4601	-0.0245	0.4111	
III	- V	-0.3590	0.1490	0.6571	
III	- Solvent	-0.1141	0.3183	0.7506	
III	- I	-0.0021	0.4494	0.9009	
V	- IV	-0.6391	-0.1769	0.2853	
V	- II	-0.6388	-0.1735	0.2917	
V	- III	-0.6571	-0.1490	0.3590	
V	- Solvent	-0.2930	0.1692	0.6314	
V	- I	-0.1798	0.3004	0.7806	
Solvent	- IV	-0.7235	-0.3462	0.0312	
Solvent	- II	-0.7239	-0.3428	0.0384	
Solvent	- III	-0.7506	-0.3183	0.1141	
Solvent	- V	-0.6314	-0.1692	0.2930	
Solvent	- I	-0.2681	0.1311	0.5304	
I	- IV	-0.8765	-0.4773	-0.0781	***
I	- II	-0.8767	-0.4739	-0.0711	***
I	- III	-0.9009	-0.4494	0.0021	
I	- V	-0.7806	-0.3004	0.1798	
I	- Solvent	-0.5304	-0.1311	0.2681	

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

General Linear Models Procedure

Bonferroni (Dunn) T tests for variable: MWT

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= 120 MSE= 0.018129

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
II - IV	-0.13294	-0.01998	0.09298
II - III	-0.11183	0.01728	0.14638
II - Solvent	-0.07102	0.04194	0.15490
II - I	-0.05897	0.06040	0.17977
II - V	-0.05134	0.08655	0.22445
III - IV	-0.16540	-0.03726	0.09088
III - II	-0.14638	-0.01728	0.11183
III - Solvent	-0.10347	0.02466	0.15280
III - I	-0.09070	0.04312	0.17695
III - V	-0.08130	0.06928	0.21986
Solvent - IV	-0.17377	-0.06192	0.04992
Solvent - II	-0.15490	-0.04194	0.07102
Solvent - III	-0.15280	-0.02466	0.10347
Solvent - I	-0.09986	0.01846	0.13678
Solvent - V	-0.09237	0.04462	0.18160
I - IV	-0.19870	-0.08038	0.03793
I - II	-0.17977	-0.06040	0.05897
I - III	-0.17695	-0.04312	0.09070
I - Solvent	-0.13678	-0.01846	0.09986
I - V	-0.11616	0.02615	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
IV - Solvent	0.0588	0.3462	0.6335
II - Solvent	0.0525	0.3428	0.6330
III - Solvent	-0.0110	0.3183	0.6475

| V   - Solvent | -0.1827 | 0.1692 | 0.5212 |
| I   - Solvent | -0.4351 | -0.1311 | 0.1729 |

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

General Linear Models Procedure

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

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= 0.018129
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
IV - Solvent	-0.02324	0.06192	0.14709
II - Solvent	-0.04408	0.04194	0.12795
III - Solvent	-0.07291	0.02466	0.12223
I - Solvent	-0.10856	-0.01846	0.07163
V - Solvent	-0.14892	-0.04462	0.05969

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

General Linear Models Procedure

Dependent Variable: FLNGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	6.6993357	1.1165560	5.00	0.0001
Error	129	28.7980172	0.2232404		
Corrected Total	135	35.4973529			

R-Square	C.V.	Root MSE	FLNGTH Mean
0.188728	5.661474	0.4725	8.3456

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	6.6972403	1.3394481	6.00	0.0001
REP	1	0.0020954	0.0020954	0.01	0.9230

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	6.6496298	1.3299260	5.96	0.0001
REP	1	0.0020954	0.0020954	0.01	0.9230

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

General Linear Models Procedure

Dependent Variable: FWT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F

Model	6	0.2557936	0.0426323	1.01	0.4240
Error	129	5.4642505	0.0423585		
Corrected Total	135	5.7200441			

R-Square	C.V.	Root MSE	FWT Mean
0.044719	17.41781	0.2058	1.1816

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	0.2518766	0.0503753	1.19	0.3180
REP	1	0.0039170	0.0039170	0.09	0.7615

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	0.2498377	0.0499675	1.18	0.3227
REP	1	0.0039170	0.0039170	0.09	0.7615

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

General Linear Models Procedure
Least Squares Means

TRT	FLNGTH LSMEAN	LSMEAN Number
I	8.24615385	1
II	8.45270889	2
III	8.53752254	3
IV	8.64757625	4
Solvent	7.98078976	5
V	8.27460512	6

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6
1	.	0.1635	0.0241	0.0056	0.0475	0.8399
2	0.1635	.	0.5578	0.2191	0.0019	0.2553
3	0.0241	0.5578	.	0.4319	0.0001	0.0578
4	0.0056	0.2191	0.4319	.	0.0001	0.0151
5	0.0475	0.0019	0.0001	0.0001	.	0.0409
6	0.8399	0.2553	0.0578	0.0151	0.0409	.

TRT	FWT LSMEAN	LSMEAN Number
I	1.16769231	1
II	1.24737641	2
III	1.16607576	3
IV	1.24182111	4
Solvent	1.17892020	5
V	1.11253990	6

Pr > |T| H0: LSMEAN(i)=LSMEAN(j)

i/j	1	2	3	4	5	6
1	.	0.2168	0.9769	0.2350	0.8462	0.3695
2	0.2168	.	0.1983	0.9357	0.2932	0.0492
3	0.9769	0.1983	.	0.2152	0.8203	0.3725
4	0.2350	0.9357	0.2152	.	0.3176	0.0523
5	0.8462	0.2932	0.8203	0.3176	.	0.2861
6	0.3695	0.0492	0.3725	0.0523	0.2861	.

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

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

General Linear Models Procedure

Bonferroni (Dunn) T tests for variable: FLNGTH

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= 0.22324
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	
IV	- III	-0.3076	0.1094	0.5265	
IV	- II	-0.2773	0.1944	0.6662	
IV	- V	-0.0803	0.3724	0.8251	
IV	- I	-0.0253	0.4012	0.8277	
IV	- Solvent	0.2373	0.6674	1.0975	***
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	***
II	- IV	-0.6662	-0.1944	0.2773	
II	- III	-0.5166	-0.0850	0.3467	
II	- V	-0.2882	0.1779	0.6441	
II	- I	-0.2340	0.2068	0.6475	
II	- Solvent	0.0287	0.4729	0.9172	***
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	
I	- IV	-0.8277	-0.4012	0.0253	
I	- III	-0.6734	-0.2918	0.0899	
I	- II	-0.6475	-0.2068	0.2340	
I	- V	-0.4491	-0.0288	0.3915	
I	- Solvent	-0.1297	0.2662	0.6620	
Solvent - IV		-1.0975	-0.6674	-0.2373	***
Solvent - III		-0.9436	-0.5579	-0.1723	***
Solvent - II		-0.9172	-0.4729	-0.0287	***
Solvent - V		-0.7189	-0.2950	0.1289	
Solvent - I		-0.6620	-0.2662	0.1297	

these treatment means are larger than the Solvent control

Cypermethrin: Mysid Life Cycle
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General Linear Models Procedure

Bonferroni (Dunn) T tests for variable: FWT

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	- II	-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
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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 Lower	Difference	Simultaneous Upper

TRT Comparison		Confidence Limit	Between Means	Confidence Limit
IV	- Solvent	0.3412	0.6674	0.9935
III	- Solvent	0.2655	0.5579	0.8504
II	- Solvent	0.1361	0.4729	0.8098
V	- Solvent	-0.0265	0.2950	0.6165
I	- Solvent	-0.0340	0.2662	0.5663

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	A B
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
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General Linear Models Procedure

Dependent Variable: MLNGTH

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		MLNGTH Mean
0.169627	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
TRT	5	4.5709329	0.9141866	4.31	0.0013
REP*TRT	5	0.3620394	0.0724079	0.34	0.8870

Source	DF	Type III SS	Mean Square	F Value	Pr > F
REP	1	0.0985641	0.0985641	0.46	0.4969
TRT	5	4.3189703	0.8637941	4.07	0.0019
REP*TRT	5	0.3620394	0.0724079	0.34	0.8870

Tests of Hypotheses using the Type III MS for REP*TRT as an error term

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	4.3189703	0.8637941	11.93	0.0083

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

General Linear Models Procedure

Dependent Variable: MWT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	0.1688431	0.0153494	0.82	0.6225
Error	115	2.1589301	0.0187733		
Corrected Total	126	2.3277732			

R-Square	C.V.	Root MSE		MWT Mean
0.072534	14.50083	0.1370		0.9449

Source	DF	Type I SS	Mean Square	F Value	Pr > F
REP	1	0.0000229	0.0000229	0.00	0.9722
TRT	5	0.1522765	0.0304553	1.62	0.1596
REP*TRT	5	0.0165437	0.0033087	0.18	0.9710

Source	DF	Type III SS	Mean Square	F Value	Pr > F
REP	1	0.0000001	0.0000001	0.00	0.9984
TRT	5	0.1292945	0.0258589	1.38	0.2379
REP*TRT	5	0.0165437	0.0033087	0.18	0.9710

Tests of Hypotheses using the Type III MS for REP*TRT as an error term

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	0.1292945	0.0258589	7.82	0.0207

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM
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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	MLNGTH LSMEAN	LSMEAN Number
I	7.95277778	1
II	8.41282051	2
III	8.38750000	3
IV	8.42060606	4
Solvent	8.07440476	5
V	8.26250000	6

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

i/j	1	2	3	4	5	6
1	.	0.0022	0.0047	0.0021	0.1866	0.0272
2	0.0022	.	0.7807	0.9222	0.0065	0.1825
3	0.0047	0.7807	.	0.7158	0.0146	0.2880
4	0.0021	0.9222	0.7158	.	0.0058	0.1637
5	0.1866	0.0065	0.0146	0.0058	.	0.1092
6	0.0272	0.1825	0.2880	0.1637	0.1092	.

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

TRT	MWT LSMEAN	LSMEAN Number
I	0.91166667	1
II	0.97067308	2
III	0.95312500	3
IV	0.98730303	4
Solvent	0.92839286	5
V	0.88763889	6

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

i/j	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
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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

Critical Value of Dunnett's T= 3.025

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	0.12036	0.34615	0.57194
II	- Solvent	0.11473	0.34277	0.57081
III	- Solvent	0.05959	0.31827	0.57695
V	- Solvent	-0.10731	0.16923	0.44577
I	- Solvent	-0.36999	-0.13114	0.10772

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: MWT

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= 0.003309
Critical Value of Dunnett's T= 3.025

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	0.01366	0.06192	0.11019
II	- Solvent	-0.00681	0.04194	0.09069
III	- Solvent	-0.03063	0.02466	0.07996
I	- Solvent	-0.06952	-0.01846	0.03260
V	- Solvent	-0.10373	-0.04462	0.01450

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

General Linear Models Procedure

Dependent Variable: FLNGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	10.084365	0.916760	4.47	0.0001
Error	124	25.412988	0.204943		
Corrected Total	135	35.497353			

R-Square	C.V.	Root MSE	FLNGTH Mean
0.284088	5.424504	0.4527	8.3456

Source	DF	Type I SS	Mean Square	F Value	Pr > F
REP	1	0.0497059	0.0497059	0.24	0.6233
TRT	5	6.6496298	1.3299260	6.49	0.0001
REP*TRT	5	3.3850297	0.6770059	3.30	0.0078

Source	DF	Type III SS	Mean Square	F Value	Pr > F
REP	1	0.0764611	0.0764611	0.37	0.5424
TRT	5	7.4738595	1.4947719	7.29	0.0001
REP*TRT	5	3.3850297	0.6770059	3.30	0.0078

Tests of Hypotheses using the Type III MS for REP*TRT as an error term

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	7.4738595	1.4947719	2.21	0.2025

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM
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General Linear Models Procedure

Dependent Variable: 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	1	0.0059559	0.0059559	0.14	0.7096
TRT	5	0.2498377	0.0499675	1.17	0.3284
REP*TRT	5	0.1620343	0.0324069	0.76	0.5819

Source	DF	Type III SS	Mean Square	F Value	Pr > F
REP	1	0.0001678	0.0001678	0.00	0.9502
TRT	5	0.2544060	0.0508812	1.19	0.3180
REP*TRT	5	0.1620343	0.0324069	0.76	0.5819

Tests of Hypotheses using the Type III MS for REP*TRT as an error term

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	0.2544060	0.0508812	1.57	0.3163

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM
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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	FLNGTH LSMEAN	LSMEAN Number
I	8.24615385	1
II	8.45000000	2
III	8.55961538	3
IV	8.65555556	4
Solvent	7.95166667	5
V	8.25202020	6

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

i/j	1	2	3	4	5	6
1	.	0.4635	0.2185	0.1604	0.2618	0.9819
2	0.4635	.	0.6818	0.4886	0.1146	0.4998
3	0.2185	0.6818	.	0.7099	0.0443	0.2569
4	0.1604	0.4886	0.7099	.	0.0387	0.1875
5	0.2618	0.1146	0.0443	0.0387	.	0.2831
6	0.9819	0.4998	0.2569	0.1875	0.2831	.

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

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

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