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

1. **CHEMICAL:** Naled PC Code No.: 034401

2. **TEST MATERIAL:** Naled Technical Purity: 89.2%

3. **CITATION:**

Authors: Joseph V. Sousa
Title: Naled - The Chronic Toxicity to Mysid (*Mysidopsis bahia*) Under Flow-Through Conditions
Study Completion Date: January 18, 2000
Laboratory: Springborn Laboratories, Inc., Wareham, MA
Sponsor: Amvac Chemical Corporation, City of Commerce, CA
Laboratory Report ID: 12709.0985.6137.530
MRID No.: 450317-01
DP Barcode: D265866

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

Signature: Karl Bullock **Date:** 6/27/2000

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

Signature: P. Kosalwat **Date:** 6/27/2000

5. **APPROVED BY:** Curtis Laird, USEPA

Signature: Curtis E. Laird **Date:** 8-29-00

6. **STUDY PARAMETERS:**

Age of Test Organism: ≤24 hours
Definitive Test Duration: 31 days
Study Method: Flow-Through
Type of Concentrations: Mean Measured

7. **CONCLUSIONS:** This study is scientifically sound but does not fulfill the guideline requirements for an estuarine invertebrate life cycle test using mysids. Based on the most sensitive endpoints (male and female total body lengths), the LOEC for mysids exposed to Naled Technical was 0.20 ppb. Due to growth effects at all test levels, the NOEC and MATC could not be determined.

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Results Synopsis

Most sensitive endpoint: Growth (male and female total length)

NOEC: Not determined
LOEC: 0.20 ppb
MATC: Not determined

LOEC's for specific effects

# Young/Female Reproductive Day:	>2.8 ppb
Survival:	1.2 ppb
Male length:	0.20 ppb
Female length:	0.20 ppb
Male dry weight:	1.2 ppb
Female dry weight:	2.8 ppb

8. **ADEQUACY OF THE STUDY:**

   A. Classification: Supplemental.

   B. Rationale: NOEC and MATC were not determined.

   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. Due to treatment-related effects at all tested concentrations, the NOEC and MATC could not be determined.

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	31 days
Source (or supplier)	In-house cultures

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	≥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 31 days. Time to sexual maturation of surviving mysids was reported to be 19 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 19.
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.

Guideline Criteria	Reported Information
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 19 (the first day that young were present). Dead mysids were removed when observed. No occurrence of sublethal effects on behavior or appearance were noted.
Controls: Survival in any control chamber (between pairing and test termination) must not be less than 70%.	85% and 88% survival in the negative and solvent controls, respectively, based on total number of mysids exposed.
Controls: Negative control and carrier control (when applicable) are required.	Negative and solvent (5.0 μL acetone/L) controls were used.

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 daily 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 mixed and aerated vigorously and screened for contaminants. 2. Salinity measured daily in each replicate was between 24 and 26‰ during the test. 3. pH measured daily in each replicate was between 7.9 and 8.1 during the test. 4. DO measured daily in each replicate was maintained at ≥66% of saturation throughout the test.
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 25°C, equal to the selected test temperature. 2) Continuous temperature monitoring in replicate B of the control ranged from 23-26°C; daily temperature measurements in all other replicates ranged from 24-26°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

Guideline Criteria	Reported Information
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. A mixing chamber was used. 2. A water-driven magnetic stir plate was used for mixing. 3. Chemical analysis of test solutions resulted in mean recoveries of Naled Technical Equivalents (Naled plus DDVP, the primary degradate) ranging from 80 - 105% of nominal concentrations. 4. Not reported.
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.

Guideline Criteria	Reported Information
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. Test compartments had Nitex® screen collars.
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. 10.3 volume additions/24 hours 2. DO maintained at ≥66% of saturation. Toxicant concentration was maintained between 80 and 105% 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.

C. **Chemical System:**

Guideline Criteria	Reported Information
Concentrations: 1) Minimum of 5 concentrations and a control, all replicated, plus solvent control if appropriate.	1. Dilution water control, 0.19, 0.38, 0.75, 1.5, and 3.0 µg ai/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, 9, 14, 24, 29, and 31.
3) One concentration must adversely affect a life stage and one concentration must not affect any life stage.	3. LOEC was obtained but NOEC could not be determined.
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.	4. Measured concentrations appeared consistent throughout the test period.
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.	5. See above.
Solvents: 1) Should not exceed 0.1 ml/L in a flow-through system.	1. 5.0 µL/L
2) Following solvents are acceptable: triethylene glycol, methanol, acetone, ethanol.	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 6.1 offspring/female in the negative control (0.47 offspring per female reproductive day).
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

Analytical Results

Naled Technical Nominal Conc. (μg ai/L)	Measured concentration			
	Naled (μg ai/L)	DDVP as Naled Equivalents[a] (μg/L)	Total Naled Equivalents (μg/L)	Percent of Nominal
Control	<0.10	<0.051	-	-
Solvent	<0.10	<0.051	-	-
0.19	0.13	0.067	0.20	105
0.38	0.21	0.12	0.33	87
0.75	0.45	0.28	0.73	97
1.5	0.71	0.54	1.2	80
3.0	1.6	1.2	2.8	93

[a]Concentrations measured as DDVP (principal degradate of Naled) were converted to Naled equivalents according to the following equation:

DDVP as Naled equivalents = Concentration of DDVP x 1.723

where: 1.723 = molecular weight ratio of Naled to DDVP

Note: On Day 24, test material was detected in the negative and solvent controls (0.14 and 0.15 μg ai/L, respectively). The authors reviewed the control contamination and believed it to be insignificant since the concentrations were below the lowest exposure concentration (0.19 μg ai/L nominal).

Effects Data:

Measured Concen. (μg Naled equiv./L)	No. of Young per female repro. day	Parent Survival (%)[a]	Mean Total Length (mm)		Mean Dry Weight (mg)	
			♂ (SD)	♀ (SD)	♂ (SD)	♀ (SD)
Control	0.47	85	8.6 (0.32)	8.5 (0.27)	0.88 (0.14)	0.91 (0.16)
Solvent	0.35	88	8.7 (0.35)	8.6 (0.33)	0.90 (0.15)	0.94 (0.17)
0.20	0.41	82	8.1[b] (0.36)	8.2[b] (0.40)	0.85 (0.17)	0.94 (0.20)
0.33	0.31	80	8.4[b] (0.34)	8.2[b] (0.43)	0.86 (0.12)	0.92 (0.20)
0.73	0.33	88	8.2[b] (0.42)	8.1[b] (0.39)	0.84 (0.12)	0.88 (0.11)
1.2	0.32	70[b]	7.9[b] (0.31)	8.0[b] (4.0)	0.79[b] (0.12)	0.90 (0.17)
2.8	0.21	60[b]	7.6[b] (0.41)	7.6[b] (0.35)	0.70[b] (0.10)	0.81[b] (0.16)

[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:

Endpoint	Method	NOEC (µg/L)	LOEC (µg/L)
Survival	Williams' Test	0.73	1.2
Reproduction	Williams' Test	0.73	>0.73
Male Length	Williams' Test	0.33	0.73
Female Length	Williams' Test	0.33	0.73
Male Dry Weight	Williams' Test	0.73	>0.73
Female Dry Weight	Williams' Test	0.73	>0.73

Comments: Percent survival data were arcsine square-root transformed prior to analysis. Analyses compared treatments to pooled control means. Growth data were not analyzed for treatments >0.73 due to significant effects on survival.

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

Endpoint	Method	NOEC (ppb)	LOEC (ppb)
Survival	Williams' Test	0.73	1.2
# Young/female	Williams' Test	2.8	>2.8
Male Length	Dunnett's Test	Not determined	0.20
Female Length	Dunnett's Test	Not determined	0.20
Male Dry Weight	Dunnett's Test	0.73	1.2
Female Dry Weight	Dunnett's Test	1.2	2.8

Comments: Treatments were compared to the solvent control. Percent survival data were arcsine square-root transformed prior to analysis.

13. **REVIEWER'S CONCLUSIONS:** This study is scientifically sound but does not fulfill the guideline requirements for an invertebrate life cycle test. Based on mean measured concentrations and the most sensitive endpoints (male and female length), the LOEC was determined to be 0.20 ppb (total Naled equivalents). Due to growth effects at all treatment levels, the NOEC and MATC could not be determined. The study is classified as **Supplemental.**

Naled Technical: Mysid Life Cycle - Survival
File: 45031701 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	0.885	1.225	1.225
2	0.20	2	0.820	1.136	1.157
3	0.33	2	0.800	1.108	1.157
4	0.73	2	0.885	1.225	1.157
5	1.2	2	0.700	0.994	0.994
6	2.8	2	0.600	0.886	0.886

Naled Technical: Mysid Life Cycle - Survival
File: 45031701 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	1.225				
0.20	1.157	1.019		1.94	k= 1, v= 6
0.33	1.157	1.019		2.06	k= 2, v= 6
0.73	1.157	1.019		2.10	k= 3, v= 6
1.2	0.994	3.432	*	2.12	k= 4, v= 6
2.8	0.886	5.023	*	2.13	k= 5, v= 6

s = 0.068
Note: df used for table values are approximate when v > 20.

Naled Technical: Mysid Life Cycle - Young/Fem/ReproDay
File: 45031701 Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 1 OF 2

GROUP	IDENTIFICATION	N	ORIGINAL MEAN	TRANSFORMED MEAN	ISOTONIZED MEAN
1	Solvent Control	2	0.355	0.355	0.378
2	0.20	2	0.400	0.400	0.378
3	0.33	2	0.310	0.310	0.320
4	0.73	2	0.325	0.325	0.320
5	1.2	2	0.325	0.325	0.320
6	2.8	2	0.210	0.210	0.210

Naled Technical: Mysid Life Cycle - Young/Fem/ReproDay
File: 45031701 Transform: NO TRANSFORM

WILLIAMS TEST (Isotonic regression model) TABLE 2 OF 2

IDENTIFICATION	ISOTONIZED MEAN	CALC. WILLIAMS	SIG P=.05	TABLE WILLIAMS	DEGREES OF FREEDOM
Solvent Control	0.378				
0.20	0.378	0.214		1.94	k= 1, v= 6
0.33	0.320	0.333		2.06	k= 2, v= 6
0.73	0.320	0.333		2.10	k= 3, v= 6
1.2	0.320	0.333		2.12	k= 4, v= 6
2.8	0.210	1.379		2.13	k= 5, v= 6

s = 0.105
Note: df used for table values are approximate when v > 20.

TRT=I

Variable	N	Mean	Std Dev	Minimum	Maximum
MLNGTH	23	8.1478261	0.3629044	7.4000000	8.8000000
FLNGTH	26	8.1653846	0.3979370	7.5000000	8.8000000
MDWT	23	0.8500000	0.1690347	0.4500000	1.3800000
FDWT	26	0.9415385	0.2041116	0.6200000	1.4100000

TRT=II

Variable	N	Mean	Std Dev	Minimum	Maximum
MLNGTH	18	8.4000000	0.3378130	7.8000000	9.0000000
FLNGTH	30	8.2066667	0.4322622	7.0000000	8.8000000
MDWT	18	0.8588889	0.1188617	0.6700000	1.1400000
FDWT	30	0.9230000	0.2038619	0.3200000	1.2800000

TRT=III

Variable	N	Mean	Std Dev	Minimum	Maximum
MLNGTH	17	8.1588235	0.4169215	7.5000000	9.2000000
FLNGTH	36	8.0861111	0.3863032	7.4000000	8.9000000
MDWT	17	0.8358824	0.1208852	0.6000000	1.0700000
FDWT	36	0.8763889	0.1147706	0.6300000	1.1400000

TRT=IV

Variable	N	Mean	Std Dev	Minimum	Maximum
MLNGTH	18	7.9000000	0.3143621	7.4000000	8.4000000
FLNGTH	24	7.9583333	0.3955367	7.2000000	8.5000000
MDWT	18	0.7927778	0.1173133	0.5600000	0.9800000
FDWT	24	0.9008333	0.1652644	0.5000000	1.2300000

TRT=Solvent

Variable	N	Mean	Std Dev	Minimum	Maximum
MLNGTH	23	8.7130435	0.3533018	7.5000000	9.2000000
FLNGTH	30	8.5733333	0.3258234	7.8000000	9.4000000
MDWT	23	0.8995652	0.1465506	0.4800000	1.1700000
FDWT	30	0.9443333	0.1680863	0.5900000	1.2600000

TRT=V

Variable	N	Mean	Std Dev	Minimum	Maximum
MLNGTH	20	7.5600000	0.4134578	6.9000000	8.3000000
FLNGTH	16	7.5750000	0.3473711	7.0000000	8.4000000
MDWT	20	0.7010000	0.0971109	0.5200000	0.9400000
FDWT	16	0.8081250	0.1550148	0.5900000	1.0900000

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 = 167

Group	Obs	Dependent Variables
1	119	MLNGTH MDWT
2	162	FLNGTH FDWT

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

General Linear Models Procedure

Dependent Variable: MLNGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	18.182802	3.030467	24.95	0.0001
Error	112	13.601568	0.121443		
Corrected Total	118	31.784370			

R-Square	C.V.	Root MSE	MLNGTH Mean
0.572067	4.270399	0.3485	8.1605

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	16.491715	3.298343	27.16	0.0001
REP	1	1.691087	1.691087	13.92	0.0003

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	16.357019	3.271404	26.94	0.0001
REP	1	1.691087	1.691087	13.92	0.0003

General Linear Models Procedure

Dependent Variable: MDWT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	0.4987231	0.0831205	4.70	0.0003
Error	112	1.9806467	0.0176843		
Corrected Total	118	2.4793697			

R-Square	C.V.	Root MSE	MDWT Mean
0.201149	16.11499	0.1330	0.8252

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	0.4911434	0.0982287	5.55	0.0001
REP	1	0.0075796	0.0075796	0.43	0.5140

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	0.4882790	0.0976558	5.52	0.0001
REP	1	0.0075796	0.0075796	0.43	0.5140

Naled Technical: Mysid Life Cycle
11:47 Tuesday, June 20, 2000

General Linear Models Procedure
Least Squares Means

TRT	MLNGTH LSMEAN	LSMEAN Number
I	8.14253541	1
II	8.37295877	2
III	8.12303367	3
IV	7.94056185	4
Solvent	8.72891550	5
V	7.56000000	6

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

i/j	1	2	3	4	5	6
1	.	0.0381	0.8618	0.0699	0.0001	0.0001
2	0.0381	.	0.0362	0.0004	0.0016	0.0001
3	0.8618	0.0362	.	0.1300	0.0001	0.0001
4	0.0699	0.0004	0.1300	.	0.0001	0.0011
5	0.0001	0.0016	0.0001	0.0001	.	0.0001
6	0.0001	0.0001	0.0001	0.0011	0.0001	.

TRT	MDWT LSMEAN	LSMEAN Number
I	0.84964580	1
II	0.85707852	2
III	0.83348628	3
IV	0.79549333	4
Solvent	0.90062782	5
V	0.70100000	6

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

i/j	1	2	3	4	5	6
1	.	0.8595	0.7055	0.2011	0.1969	0.0004
2	0.8595	.	0.6010	0.1726	0.3029	0.0005
3	0.7055	0.6010	.	0.4070	0.1201	0.0032
4	0.2011	0.1726	0.4070	.	0.0136	0.0316
5	0.1969	0.3029	0.1201	0.0136	.	0.0001
6	0.0004	0.0005	0.0032	0.0316	0.0001	.

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

11:47 Tuesday, June 20, 2000

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= 112 MSE= 0.121443
Critical Value of T= 2.99946

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

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
Solvent - II	-0.0159	0.3130	0.6420	
Solvent - III	0.2199	0.5542	0.8885	***
Solvent - I	0.2570	0.5652	0.8735	***
Solvent - IV	0.4841	0.8130	1.1420	***
Solvent - V	0.8335	1.1530	1.4726	***
II - Solvent	-0.6420	-0.3130	0.0159	
II - III	-0.1123	0.2412	0.5947	
II - I	-0.0768	0.2522	0.5811	
II - IV	0.1516	0.5000	0.8484	***
II - V	0.5004	0.8400	1.1796	***
III - Solvent	-0.8885	-0.5542	-0.2199	***
III - II	-0.5947	-0.2412	0.1123	
III - I	-0.3233	0.0110	0.3453	
III - IV	-0.0947	0.2588	0.6123	
III - V	0.2540	0.5988	0.9436	***
I - Solvent	-0.8735	-0.5652	-0.2570	***
I - II	-0.5811	-0.2522	0.0768	
I - III	-0.3453	-0.0110	0.3233	
I - IV	-0.0811	0.2478	0.5768	
I - V	0.2682	0.5878	0.9074	***
IV - Solvent	-1.1420	-0.8130	-0.4841	***
IV - II	-0.8484	-0.5000	-0.1516	***
IV - III	-0.6123	-0.2588	0.0947	
IV - I	-0.5768	-0.2478	0.0811	
IV - V	0.0004	0.3400	0.6796	***
V - Solvent	-1.4726	-1.1530	-0.8335	***
V - II	-1.1796	-0.8400	-0.5004	***
V - III	-0.9436	-0.5988	-0.2540	***
V - I	-0.9074	-0.5878	-0.2682	***
V - IV	-0.6796	-0.3400	-0.0004	***

Naled Technical: Mysid Life Cycle
11:47 Tuesday, June 20, 2000

General Linear Models Procedure

Bonferroni (Dunn) T tests for variable: MDWT

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= 112 MSE= 0.017684

Critical Value of T= 2.99946

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

TRT Comparison		Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
Solvent	- II	-0.08485	0.04068	0.16620	
Solvent	- I	-0.06806	0.04957	0.16719	
Solvent	- III	-0.06390	0.06368	0.19126	
Solvent	- IV	-0.01874	0.10679	0.23231	
Solvent	- V	0.07661	0.19857	0.32052	***
II	- Solvent	-0.16620	-0.04068	0.08485	
II	- I	-0.11664	0.00889	0.13441	
II	- III	-0.11189	0.02301	0.15791	
II	- IV	-0.06685	0.06611	0.19907	
II	- V	0.02830	0.15789	0.28748	***
I	- Solvent	-0.16719	-0.04957	0.06806	
I	- II	-0.13441	-0.00889	0.11664	
I	- III	-0.11346	0.01412	0.14170	
I	- IV	-0.06830	0.05722	0.18275	
I	- V	0.02705	0.14900	0.27095	***
III	- Solvent	-0.19126	-0.06368	0.06390	
III	- II	-0.15791	-0.02301	0.11189	
III	- I	-0.14170	-0.01412	0.11346	
III	- IV	-0.09180	0.04310	0.17800	
III	- V	0.00330	0.13488	0.26647	***
IV	- Solvent	-0.23231	-0.10679	0.01874	
IV	- II	-0.19907	-0.06611	0.06685	
IV	- I	-0.18275	-0.05722	0.06830	
IV	- III	-0.17800	-0.04310	0.09180	
IV	- V	-0.03781	0.09178	0.22137	
V	- Solvent	-0.32052	-0.19857	-0.07661	***
V	- II	-0.28748	-0.15789	-0.02830	***
V	- I	-0.27095	-0.14900	-0.02705	***
V	- III	-0.26647	-0.13488	-0.00330	***
V	- IV	-0.22137	-0.09178	0.03781	

Naled Technical: Mysid Life Cycle
11:47 Tuesday, June 20, 2000

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= 112 MSE= 0.121443
Critical Value of Dunnett's T= 2.275

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	-0.5626	-0.3130	-0.0635	***
III	- Solvent	-0.8078	-0.5542	-0.3006	***
I	- Solvent	-0.7990	-0.5652	-0.3314	***

IV	- Solvent	-1.0626	-0.8130	-0.5635	***
V	- Solvent	-1.3955	-1.1530	-0.9106	***

Naled Technical: Mysid Life Cycle
11:47 Tuesday, June 20, 2000

General Linear Models Procedure

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

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

Alpha= 0.05 Confidence= 0.95 df= 112 MSE= 0.017684
Critical Value of Dunnett's T= 2.275

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	-0.13590	-0.04068	0.05455	
I	- Solvent	-0.13879	-0.04957	0.03966	
III	- Solvent	-0.16046	-0.06368	0.03310	
IV	- Solvent	-0.20201	-0.10679	-0.01156	***
V	- Solvent	-0.29108	-0.19857	-0.10605	***

Naled Technical: Mysid Life Cycle
11:47 Tuesday, June 20, 2000

General Linear Models Procedure

Dependent Variable: FLNGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	6	12.867598	2.144600	15.10	0.0001
Error	155	22.006970	0.141980		
Corrected Total	161	34.874568			

R-Square	C.V.	Root MSE	FLNGTH Mean
0.368968	4.627906	0.3768	8.1420

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	11.787000	2.357400	16.60	0.0001
REP	1	1.080598	1.080598	7.61	0.0065

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	11.309953	2.261991	15.93	0.0001
REP	1	1.080598	1.080598	7.61	0.0065

Naled Technical: Mysid Life Cycle
11:47 Tuesday, June 20, 2000

General Linear Models Procedure

Dependent Variable: FDWT

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

Model	6	0.4628903	0.0771484	2.77	0.0139
Error	155	4.3237591	0.0278952		
Corrected Total	161	4.7866494			

R-Square	C.V.	Root MSE	FDWT Mean
0.096704	18.45636	0.1670	0.9049

Source	DF	Type I SS	Mean Square	F Value	Pr > F
TRT	5	0.2708866	0.0541773	1.94	0.0904
REP	1	0.1920037	0.1920037	6.88	0.0096

Source	DF	Type III SS	Mean Square	F Value	Pr > F
TRT	5	0.2339258	0.0467852	1.68	0.1432
REP	1	0.1920037	0.1920037	6.88	0.0096

Naled Technical: Mysid Life Cycle
11:47 Tuesday, June 20, 2000

General Linear Models Procedure
Least Squares Means

TRT	FLNGTH LSMEAN	LSMEAN Number
I	8.15905830	1
II	8.21214947	2
III	8.09981813	3
IV	7.95147982	4
Solvent	8.56236772	5
V	7.58528026	6

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

i/j	1	2	3	4	5	6
1	.	0.6001	0.5433	0.0534	0.0001	0.0001
2	0.6001	.	0.2299	0.0126	0.0004	0.0001
3	0.5433	0.2299	.	0.1383	0.0001	0.0001
4	0.0534	0.0126	0.1383	.	0.0001	0.0031
5	0.0001	0.0004	0.0001	0.0001	.	0.0001
6	0.0001	0.0001	0.0001	0.0031	0.0001	.

TRT	FDWT LSMEAN	LSMEAN Number
I	0.93887177	1
II	0.92531114	2
III	0.88216673	3
IV	0.89794441	4
Solvent	0.93971106	5
V	0.81245838	6

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

i/j	1	2	3	4	5	6
1	.	0.7625	0.1903	0.3880	0.9851	0.0186
2	0.7625	.	0.2979	0.5509	0.7394	0.0306
3	0.1903	0.2979	.	0.7212	0.1673	0.1668
4	0.3880	0.5509	0.7212	.	0.3626	0.1153
5	0.9851	0.7394	0.1673	0.3626	.	0.0152
6	0.0186	0.0306	0.1668	0.1153	0.0152	.

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

Naled Technical: Mysid Life Cycle
11:47 Tuesday, June 20, 2000

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= 155 MSE= 0.14198
Critical Value of T= 2.98138

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

TRT Comparison	Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
Solvent - II	0.07661	0.36667	0.65673	***
Solvent - I	0.10694	0.40795	0.70896	***
Solvent - III	0.20951	0.48722	0.76493	***
Solvent - IV	0.30735	0.61500	0.92265	***
Solvent - V	0.65057	0.99833	1.34610	***
II - Solvent	-0.65673	-0.36667	-0.07661	***
II - I	-0.25973	0.04128	0.34229	
II - III	-0.15715	0.12056	0.39827	
II - IV	-0.05932	0.24833	0.55599	
II - V	0.28390	0.63167	0.97943	***
I - Solvent	-0.70896	-0.40795	-0.10694	***
I - II	-0.34229	-0.04128	0.25973	
I - III	-0.20985	0.07927	0.36840	
I - IV	-0.11095	0.20705	0.52505	
I - V	0.23343	0.59038	0.94734	***
III - Solvent	-0.76493	-0.48722	-0.20951	***
III - II	-0.39827	-0.12056	0.15715	
III - I	-0.36840	-0.07927	0.20985	
III - IV	-0.16826	0.12778	0.42382	
III - V	0.17357	0.51111	0.84865	***
IV - Solvent	-0.92265	-0.61500	-0.30735	***
IV - II	-0.55599	-0.24833	0.05932	
IV - I	-0.52505	-0.20705	0.11095	
IV - III	-0.42382	-0.12778	0.16826	
IV - V	0.02076	0.38333	0.74591	***
V - Solvent	-1.34610	-0.99833	-0.65057	***
V - II	-0.97943	-0.63167	-0.28390	***
V - I	-0.94734	-0.59038	-0.23343	***
V - III	-0.84865	-0.51111	-0.17357	***
V - IV	-0.74591	-0.38333	-0.02076	***

Naled Technical: Mysid Life Cycle
11:47 Tuesday, June 20, 2000

General Linear Models Procedure

Bonferroni (Dunn) T tests for variable: FDWT

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= 155 MSE= 0.027895
Critical Value of T= 2.98138

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

TRT Comparison		Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
Solvent	- I	-0.13063	0.00279	0.13622	
Solvent	- II	-0.10724	0.02133	0.14990	
Solvent	- IV	-0.09287	0.04350	0.17987	
Solvent	- III	-0.05515	0.06794	0.19104	
Solvent	- V	-0.01794	0.13621	0.29036	
I	- Solvent	-0.13622	-0.00279	0.13063	
I	- II	-0.11488	0.01854	0.15196	
I	- IV	-0.10025	0.04071	0.18166	
I	- III	-0.06301	0.06515	0.19331	
I	- V	-0.02481	0.13341	0.29163	
II	- Solvent	-0.14990	-0.02133	0.10724	
II	- I	-0.15196	-0.01854	0.11488	
II	- IV	-0.11420	0.02217	0.15853	
II	- III	-0.07648	0.04661	0.16971	
II	- V	-0.03927	0.11488	0.26902	
IV	- Solvent	-0.17987	-0.04350	0.09287	
IV	- I	-0.18166	-0.04071	0.10025	
IV	- II	-0.15853	-0.02217	0.11420	
IV	- III	-0.10678	0.02444	0.15566	
IV	- V	-0.06800	0.09271	0.25342	
III	- Solvent	-0.19104	-0.06794	0.05515	
III	- I	-0.19331	-0.06515	0.06301	
III	- II	-0.16971	-0.04661	0.07648	
III	- IV	-0.15566	-0.02444	0.10678	
III	- V	-0.08135	0.06826	0.21788	
V	- Solvent	-0.29036	-0.13621	0.01794	
V	- I	-0.29163	-0.13341	0.02481	
V	- II	-0.26902	-0.11488	0.03927	
V	- IV	-0.25342	-0.09271	0.06800	
V	- III	-0.21788	-0.06826	0.08135	

Naled Technical: Mysid Life Cycle
11:47 Tuesday, June 20, 2000

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= 155 MSE= 0.14198
Critical Value of Dunnett's T= 2.266

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

TRT Comparison		Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	

TRT Comparison		Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
II	- Solvent	-0.58711	-0.36667	-0.14622	***
I	- Solvent	-0.63672	-0.40795	-0.17918	***
III	- Solvent	-0.69828	-0.48722	-0.27616	***
IV	- Solvent	-0.84882	-0.61500	-0.38118	***
V	- Solvent	-1.26264	-0.99833	-0.73403	***

Naled Technical: Mysid Life Cycle
11:47 Tuesday, June 20, 2000

General Linear Models Procedure

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

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

Alpha= 0.05 Confidence= 0.95 df= 155 MSE= 0.027895
Critical Value of Dunnett's T= 2.266

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

TRT Comparison		Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit	
I	- Solvent	-0.10420	-0.00279	0.09861	
II	- Solvent	-0.11905	-0.02133	0.07638	
IV	- Solvent	-0.14714	-0.04350	0.06014	
III	- Solvent	-0.16150	-0.06794	0.02561	
V	- Solvent	-0.25336	-0.13621	-0.01905	***

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM
11:47 Tuesday, June 20, 2000

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 = 167

Group	Obs	Dependent Variables
1	119	MLNGTH MDWT
2	162	FLNGTH FDWT

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
11:47 Tuesday, June 20, 2000

General Linear Models Procedure

Dependent Variable: MLNGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	18.992704	1.726609	14.44	0.0001
Error	107	12.791666	0.119548		
Corrected Total	118	31.784370			

R-Square	C.V.	Root MSE	MLNGTH Mean
0.597549	4.236963	0.3458	8.1605

Source	DF	Type I SS	Mean Square	F Value	Pr > F
REP	1	1.825782	1.825782	15.27	0.0002
TRT	5	16.357019	3.271404	27.36	0.0001
REP*TRT	5	0.809902	0.161980	1.35	0.2472

Source	DF	Type III SS	Mean Square	F Value	Pr > F
REP	1	1.777171	1.777171	14.87	0.0002
TRT	5	15.758033	3.151607	26.36	0.0001
REP*TRT	5	0.809902	0.161980	1.35	0.2472

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	15.758033	3.151607	19.46	0.0027

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM
11:47 Tuesday, June 20, 2000

General Linear Models Procedure

Dependent Variable: MDWT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	0.6177359	0.0561578	3.23	0.0008
Error	107	1.8616339	0.0173984		
Corrected Total	118	2.4793697			

R-Square	C.V.	Root MSE	MDWT Mean
0.249150	15.98419	0.1319	0.8252

Source	DF	Type I SS	Mean Square	F Value	Pr > F
REP	1	0.0104441	0.0104441	0.60	0.4402
TRT	5	0.4882790	0.0976558	5.61	0.0001
REP*TRT	5	0.1190128	0.0238026	1.37	0.2421

Source	DF	Type III SS	Mean Square	F Value	Pr > F
REP	1	0.0100141	0.0100141	0.58	0.4497
TRT	5	0.4533108	0.0906622	5.21	0.0003
REP*TRT	5	0.1190128	0.0238026	1.37	0.2421

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	0.4533108	0.0906622	3.81	0.0842

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM
11:47 Tuesday, June 20, 2000

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	8.14583333	1
II	8.37662338	2
III	8.12272727	3
IV	7.95416667	4
Solvent	8.71846154	5
V	7.56000000	6

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

i/j	1	2	3	4	5	6
1	.	0.1325	0.8681	0.2035	0.0049	0.0051
2	0.1325	.	0.1318	0.0295	0.0454	0.0016
3	0.8681	0.1318	.	0.2926	0.0065	0.0091
4	0.2035	0.0295	0.2926	.	0.0021	0.0330
5	0.0049	0.0454	0.0065	0.0021	.	0.0002
6	0.0051	0.0016	0.0091	0.0330	0.0002	.

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

TRT	MDWT LSMEAN	LSMEAN Number
I	0.84943182	1
II	0.85311688	2
III	0.84401515	3
IV	0.80875000	4
Solvent	0.89442308	5
V	0.70100000	6

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

i/j	1	2	3	4	5	6
1	.	0.9433	0.9191	0.4549	0.3702	0.0255
2	0.9433	.	0.8729	0.4459	0.4415	0.0303
3	0.9191	0.8729	.	0.5493	0.3670	0.0408
4	0.4549	0.4459	0.5493	.	0.1499	0.0918
5	0.3702	0.4415	0.3670	0.1499	.	0.0095
6	0.0255	0.0303	0.0408	0.0918	0.0095	.

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
11:47 Tuesday, June 20, 2000

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= 0.16198

Critical Value of Dunnett's T= 3.009

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	-0.6941	-0.3130	0.0680	
III	- Solvent	-0.9415	-0.5542	-0.1669	***
I	- Solvent	-0.9223	-0.5652	-0.2081	***
IV	- Solvent	-1.1941	-0.8130	-0.4320	***
V	- Solvent	-1.5233	-1.1530	-0.7828	***

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM
11:47 Tuesday, June 20, 2000

General Linear Models Procedure

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

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= 0.023803
Critical Value of Dunnett's T= 3.009

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	-0.18676	-0.04068	0.10541	
I	- Solvent	-0.18645	-0.04957	0.08732	
III	- Solvent	-0.21215	-0.06368	0.08479	
IV	- Solvent	-0.25287	-0.10679	0.03929	
V	- Solvent	-0.34049	-0.19857	-0.05664	***

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM
11:47 Tuesday, June 20, 2000

General Linear Models Procedure

Dependent Variable: FLNGTH

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	14.291419	1.299220	9.47	0.0001
Error	150	20.583149	0.137221		
Corrected Total	161	34.874568			

R-Square	C.V.	Root MSE	FLNGTH Mean
0.409795	4.549676	0.3704	8.1420

Source	DF	Type I SS	Mean Square	F Value	Pr > F
REP	1	1.557644	1.557644	11.35	0.0010
TRT	5	11.309953	2.261991	16.48	0.0001
REP*TRT	5	1.423821	0.284764	2.08	0.0716

Source	DF	Type III SS	Mean Square	F Value	Pr > F
REP	1	1.211949	1.211949	8.83	0.0034
TRT	5	11.147712	2.229542	16.25	0.0001
REP*TRT	5	1.423821	0.284764	2.08	0.0716

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	11.147712	2.229542	7.83	0.0207

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM
11:47 Tuesday, June 20, 2000

General Linear Models Procedure

Dependent Variable: FDWT

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	11	0.7289518	0.0662683	2.45	0.0077
Error	150	4.0576976	0.0270513		
Corrected Total	161	4.7866494			

R-Square	C.V.	Root MSE	FDWT Mean
0.152289	18.17503	0.1645	0.9049

Source	DF	Type I SS	Mean Square	F Value	Pr > F
REP	1	0.2289645	0.2289645	8.46	0.0042
TRT	5	0.2339258	0.0467852	1.73	0.1312
REP*TRT	5	0.2660615	0.0532123	1.97	0.0867

Source	DF	Type III SS	Mean Square	F Value	Pr > F
REP	1	0.1652063	0.1652063	6.11	0.0146
TRT	5	0.2612319	0.0522464	1.93	0.0924
REP*TRT	5	0.2660615	0.0532123	1.97	0.0867

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	0.2612319	0.0522464	0.98	0.5078

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM
11:47 Tuesday, June 20, 2000

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	8.15833333	1
II	8.20133929	2
III	8.11380952	3
IV	7.94475524	4
Solvent	8.57013575	5
V	7.59682540	6

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

i/j	1	2	3	4	5	6
1	.	0.7763	0.7607	0.2178	0.0353	0.0217
2	0.7763	.	0.5393	0.1404	0.0448	0.0149
3	0.7607	0.5393	.	0.2864	0.0188	0.0242
4	0.2178	0.1404	0.2864	.	0.0081	0.1009
5	0.0353	0.0448	0.0188	0.0081	.	0.0021
6	0.0217	0.0149	0.0242	0.1009	0.0021	.

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

TRT	FDWT LSMEAN	LSMEAN Number
I	0.93851190	1
II	0.92964286	2
III	0.88300000	3
IV	0.89790210	4
Solvent	0.94871041	5
V	0.81039683	6

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

i/j	1	2	3	4	5	6
1	.	0.8918	0.3961	0.5625	0.8761	0.1428
2	0.8918	.	0.4539	0.6377	0.7631	0.1578
3	0.3961	0.4539	.	0.8175	0.3062	0.3471
4	0.5625	0.6377	0.8175	.	0.4603	0.2954
5	0.8761	0.7631	0.3062	0.4603	.	0.1128
6	0.1428	0.1578	0.3471	0.2954	0.1128	.

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
11:47 Tuesday, June 20, 2000

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= 0.284764
Critical Value of Dunnett's T= 3.005

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	-0.7807	-0.3667	0.0474	
I	- Solvent	-0.8376	-0.4079	0.0217	
III	- Solvent	-0.8836	-0.4872	-0.0908	***
IV	- Solvent	-1.0541	-0.6150	-0.1759	***
V	- Solvent	-1.4947	-0.9983	-0.5019	***

ANALYSIS USING TRT*REP INTERACTION AS THE ERROR TERM
11:47 Tuesday, June 20, 2000

General Linear Models Procedure

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

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= 0.053212
Critical Value of Dunnett's T= 3.005

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

TRT Comparison		Simultaneous Lower Confidence Limit	Difference Between Means	Simultaneous Upper Confidence Limit
I	- Solvent	-0.18853	-0.00279	0.18294
II	- Solvent	-0.20031	-0.02133	0.15764
IV	- Solvent	-0.23333	-0.04350	0.14633
III	- Solvent	-0.23930	-0.06794	0.10341
V	- Solvent	-0.35079	-0.13621	0.07838