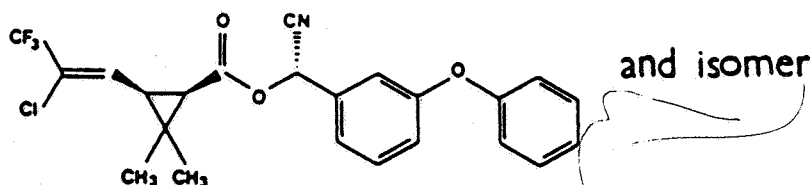


DATA EVALUATION RECORD

1. Chemical: PP 321 (Lambda Cyhalothrin)
2. Test Material: ^{14}C [phenyl] lambda* cyhalothrin (PP321)
98.5% w/w IUPAC Chemical name:
(R)- a -cyano-3-phenoxybenzyl (1S)-cis-3-
[Z-2-chloro-3,3,3-trifluoroprop-1-enyl]-2,2-
dimethylcyclopropanecarboxylate
(S)- a -cyano-3-phenoxybenzyl (1R)-cis-3-
[Z-2-chloro-3,3,3-trifluoroprop-1-enyl]-2,3-
dimethylcyclopropanecarboxylate

Lambda cyhalothrin is the racemic mixture containing the above two isomers in a 1:1 ratio



3. Study Type: Mysid Life-Cycle Toxicity Testing - Flow Through
Species Tested: Mysid Shrimp
(Mysidopsis bahia)
4. Study Title: Thompson, R.S. (1987) PP 321 (Lambda Cyhalothrin)
Determination of Chronic Toxicity to mysid
shrimps (Mysidopsis bahia). Prepared by:
ICI PLC Brixham Laboratory. Submitted by ICI
America, Inc. EPA Accession No. unknown.
5. Reviewed By: Candy Brassard
FEB/HED
Signature: *Candy Brassard*
Date: *3-16-88*
6. Approved By: Douglas J. Urban
Head-Section III
FEB/HED
Signature: *Douglas J. Urban*
Date: *3/21/88*

*It should be noted Lambda cyhalothrin is PP321 or Karate. It is not cyhalothrin. Confirmed with Jim Wagner, ICI, March 3, 1988.

7. Conclusion:

The study appears to be scientifically sound. However, based on the incomplete raw data, the reproductive success can not be calculated. Therefore the study is classified as "supplemental." The current data indicate that reproduction may be affected at 0.46 ng/L and the NOEL = 0.22 ng/L. Survival and dry weights were determined to have a NOEL = 1.7 ng/L and a LOEL = 3.7 ng/L (measured concentration). ✓

8. Recommendations:

The study author should submit raw data with regards to number of females and males per test chamber per replicate on a daily basis from test initiation to test termination. The study author must also clarify the data discrepancies with regards to the measured concentration concerns. See Section 14 A.

9. Background:

This study was submitted to support registration of PP 321 for use on cotton and soybeans.

10. Discussion of Individual Tests: N/A

11. Materials and Methods:

- a. Test Organisms - The mysid shrimp were < 24 hours old derived from continuous cultures at the Brixham Laboratory. No symptoms of disease had been observed.

The mysids had been fed *Artemia nauphii* at a rate of 1820 to 4550 nauplii per chamber per day.

- b. Test System (excerpted from submission) - Rectangular tanks (71 cm x 28.5 cm x 7 cm working depth) constructed of glass and silicone rubber sealant divided length ways to provide two replicates, each of 7.5 liters working volume, were employed. Each replicate vessel contained four retention chambers, constructed from glass beakers of 100 mm diameter and 500 mL working volume, with a window cut in the side which was covered by nylon mesh. Each chamber had a loose fitting lid.

The test vessels drained automatically to approximately one-half of working volume (4.5 cm reduction in working depth) every 45 minutes, to ensure exchange of test solution between vessel and retention chambers. No aeration was used in the exposure vessels.

Dilution water flows of 500 mL/minute (720 l/day) for each control and test concentration were obtained by use of fixed aperture outlets from a constant head tank. The stock solutions of the test substance in triethylene glycol were delivered by syringe pump to mix with the dilution water in chambers of approximately 0.5 litres working volume, stirred by magnetic follower. The flow rate of the stock solutions was 0.00183 mL/minute. The solvent control received triethylene glycol delivered in the same manner. The test solution flow was divided equally between the duplicate vessels. All flow rates were checked daily.

The loading factors were 0.38 litres (tank volume)/mysid and 18 litres/day (flow)/mysid.

Temperature of dilution water was maintained at 25 +/- 1 C. The photoperiod was controlled to provide 14 hours light 10 hours dark with gradual transition periods of 15 minutes.

Physical and Chemical Analysis

Physical (excerpted from submission) - "The dissolved oxygen, pH and temperature of each test solution were measured three times during the first week and twice per week thereafter, alternating between the duplicate tanks. The salinity of the control (dilution water) was measured daily. In addition, the temperature of the solvent control was measured daily by thermometer and monitored hourly using an electronic recording system (platinum resistance sensor)." The following ranges were reported.

pH values	7.90 to 8.20
Dissolved oxygen	6.35 to 7.55 mg/L
Temperature	24.6 to 25.7 C
Salinity	19.1 to 20.8 /oo

Chemical (excerpted from submission) - "Each test solution was sampled five times in the first week and twice per week thereafter for determination of the concentration of the test substance (as ¹⁴C activity).

Samples from the highest concentration tested (0.01 ug/L nominal) were also analysed for lambda cyhalothrin by gas chromatography. However, with one exception or which contamination was suspected, the concentrations proved to be below the detection limit of the method (0.01 ug/L).

Once per week the stock solutions used for the nominal 0.00065 and 0.01 ug/L concentrations were analysed by radiochemistry and gas chromatography, at the start and

finish of the 3 or 4 day interval between refilling the syringe pumps. The radiochemical and specific analytical methods are given in Appendix 1."

Radiochemical Analysis - For each concentration the measured concentrations were relatively constant, with two exception day 8 a low value (0.00087 ug/L) was recorded for the nominal 0.010 ug/L test solution. On day 13 a sample from nominal 0.00065 ug/L test solution was below detection limit but it was not apparent until day 15 when a leak was detected in the dosing line. The study author reported that this nominal concentration was not receiving the correct quantity of stock solution for the 3-day period following renewal of the stock solutions on day 12.

Both these low values were included in the calculation of the means and standard deviations given in Table 7.

Mean measured concentrations ranged from 48 to 74 percent of the nominal value.

- c. Dose - The six treatment levels included the following nominal doses: 0.00033, 0.0065, 0.0013, 0.0025, 0.005 and 0.01 ug/L. There were also a control and a solvent control. The solvent control and each treatment level received 0.0037 mL triethylene glycol/litre.
- d. Study Design - Forty mysids were randomly assigned to each control and dose, with five per chamber, and four retention chambers per replicate. Two replicates per treatment level were used.

Prior to test initiation, the test solutions had been running through test vessels for > 24 hours. The study duration was 28 days.

Mysid Observations

Mortalities (excerpted from submission) - "Mortalities of the mysids in each retention chamber were assessed daily. Mortality was defined as absence of signs of life when viewed by eye, if necessary after removal of the retention chamber, with residual test solution, to an illuminated viewing area. Dead animals found on the sides or lid of the retention chambers, above the maximum water level of the system, were recorded separately, since these must have jumped from the test solution. From Day 14 the sex of dead mysids were recorded."

Mysid Pairing (excerpted from submission) - "After 14 days, the sex of each mysid was determined, and the animals were redistributed, if necessary within the replicate vessel, in order to minimize the number of chambers with extreme sex ratios. Females from chambers found to contain no males were not redistributed and were retained for growth and survival measurements only. Any excess males were retained and used to replace subsequent male mortalities in the paired chambers. Offspring were counted and removed daily from each retention chamber."

Growth Measurement (excerpted from submission) - At the end of the test, the dry weights of the surviving mysids were determined. The mysids were killed with formaldehyde, rinsed briefly in distilled water and dried for 42 hours at 105 C. Dry weights (to 0.01 mg) of individuals were determined and recorded separately for males and females.

12. Reported Results:

Mortality - The test substance caused significant mortality of the mysids at > 0.0037 ug/L (measured concentration). There was no effect on survival < 0.0017 ug/L (measured concentration). See Table 1 and Appendix 4.

Growth (Dry Weights)

There was no-effect on the weight of male or female mysids at 0.0007 ug/L (measured concentrations).

The female dry weight was significantly lower than pooled controls at > 0.0017 ug/L (measured concentrations).

Male dry weight was significantly lower than the pooled controls > 0.0037 ug/L (measured concentrations).

Reproduction (excerpted from submission) - The raw data for reproduction are given in Appendix 5. No offspring were produced at the highest nominal concentration tested (0.010 ug/L). Only one young mysid was produced at the next highest nominal concentration (0.005 ug/L). Therefore it was not considered necessary to include these concentrations in the statistical analyses as described below.

The day on which offspring were first observed is given in Table 5. First release of offspring in the control and solvent control was observed on day 16 and 17, respectively. With the exception of the two highest concentrations tested (see above), offspring were first observed on day 17 and 18 in the test substance concentrations, and no concentration related delay in the onset of reproduction was apparent.

The numbers of offspring produced in each retention chamber was divided by the number of "available female reproductive days" (AFRD) for that chamber and the resulting "offspring/AFRD" data are given in Table 4. AFRD was defined as the sum of the survival periods (days, from day 16) of the females in the chamber (AFRD = 12 for a female surviving to the end of the test). Chambers were excluded from the calculations if the AFRD was less than five, or if no males were present in the chamber on day 16. The data in Table 4 excludes those chambers in which available females were present but no offspring were produced (i.e., offspring/AFRD = 0).

Table 5 gives the offspring/AFRD values on a "per replicate" basis. The total number of offspring for the replicate vessel was divided by the corresponding total AFRD, thereby including the AFRD of non-reproductive chambers. It should be noted that, although the control, solvent control and the two lowest concentrations contained no non-reproductive chambers, the mean offspring/AFRD values differ slightly from those in Table 4 when calculated in this manner. Table 5 also shows the total number of offspring and AFRD from which "offspring/AFRD" was calculated for each replicate. If offspring/AFRD values are multiplied by 12 (see above) the result is "offspring per female (corrected for mortality)".

Using the "per chamber" data in Table 4, the A and B replicates for the control and solvent control were compared (2-sided) using Student's t-test. In each case there was no significant difference ($P = 0.05$) between replicates, and therefore these were pooled for each treatment. The control and solvent control were similarly compared and were not significantly different ($P > 0.2$). Therefore the test substance concentrations were compared with the pooled control and solvent control using Dunnett's procedure (Ref 3).

Offspring/AFRD was significantly reduced ($P = 0.05$) compared with the pooled controls at and above a nominal concentration of 0.00065 ug/L.

The "per replicate" data in Table 5 were examined in a similar manner. The results confirmed the reduction in reproduction and at and above a nominal concentration of 0.00065 ug/L (mean measured concentration of 0.00046 ug/L) at which offspring/AFRD was reduced by 66 percent compared with the pooled controls. There was no effect at a nominal concentration of 0.00033 ug/L (mean measured concentration of 0.00022 ug/L) at which offspring/AFRD was 97 percent of that of pooled controls."

Mortality - The data in Table 1 (total mortality) were analyzed using Dunnett's procedure following arcsine transformation of the square root of the survival coefficient

(number surviving/number tested) comparing (one-sided) the test substance concentrations with the pooled controls (solvent and dilution water control).

Dry Weights - For each sex the A and B replicates for the control and solvent control were compared (2-sided) using Student's t-test. The A and B replicates were pooled for each treatment. For each sex, the control and the solvent control were similarly compared. There was no difference between control and solvent control for either sex, therefore the test substance concentrations were compared (1-sided) with the pooled controls using Dunnett's procedure.

Reproduction - See Section 12. Reproduction - for detailed description of data analysis.

13. Study Author's Conclusions/QA Measures (excerpted from submission):

There were no deleterious effects on mysid survival, growth (weight) or reproduction during the 28-day exposure period at a nominal concentration of 0.00033 ug lambda cyhalothrin/l (mean measured concentration of 0.00022 ug/L by radiochemistry).

There was a significant reduction in reproduction of mysids at a nominal concentration of 0.00065 ug lambda cyhalothrin/l (mean measured concentration of 0.00046 ug/L by radiochemistry).

The maximum acceptable toxicant concentration (MATC), calculated as the geometric mean of the highest no observed effect concentration and the lowest concentration causing a significant effect, was 0.00032 ug/L based on mean measured concentrations.

QA Measures

The conduct of this study has been inspected/audited in accordance with ICI's policies and procedures for Good Laboratory Practice, as follows.

14. Reviewer s Discussion and Interpretation of Study Results:

The following discrepancies were noted:

a. Test Procedures -

The study design included five mysids per retention chamber. Current methodology includes only pairs (one male and one female) per retention chamber.

This study design makes it difficult, if not impossible to determine the number of young per female, which is a necessary reproductive parameter for the mysid life-cycle study. However, since the EPA recommended protocol in 1982 Subdivision E in "Bioassay Procedures for Ocean, Disposal Permit Program" 1978 recommends five per retention chamber, EEB will accept the study design. Future study designs should be based on current methodology.

Only a summary of young per retention chamber per replicate were submitted (Appendix 5) and the total available female reproductive days (AFRD) were given per retention chamber. The study author failed to report the number of males and females per retention chamber per replicate at test initiation and daily throughout the study until test termination.

These raw data are required so that the average number of young per female may be determined as well as the brood size, and the percent reproductively active females. The number of young per female (in this case only average can be used) divided by the number of reproductive days per female is the recommended measurement for reproductive success. With the data submitted, this can not be calculated. It also appears from the data that the number of females per treatment level varied since the number of AFRD varied between the treatment levels, and was not dose related.

The study author should indicate why a measurement for residue on day 15 was not taken (at the nominal concentration 0.65 ng/l treatment level) when the leak in the diluter was discovered. ✓

The study author must also report why the measured concentration data were not available on day 9 except for the highest dose tested. Especially, since there was an increase in mortality ranging from 5 to 25% within each replicate on that day.

- b. Statistical Analysis - Based on the data submitted, ANOVA statistical analysis along with Duncans multiple range test were conducted. The results are as follows:

(measured concentrations)

% survival NOEL = 1.7 μ g/L LOEL = 3.7 μ g/L
 MATC = > 1.7 μ g/L < 3.7 μ g/L

ng/L

Limited Reproduction Data

No. of Young NOEL = 0.22 μ g/L LOEL = 0.46 μ g/L
Per Reproductive MATC = > 0.22 μ g/L < 0.46 μ g/L

(per Day replicate)

No. of Young NOEL = 0.22 μ g/L LOEL = 0.46 μ g/L
per treatment level MATC = 0.22 μ g/L < 0.46 μ g/L

Dry Weights Female - NOEL = 1.7 μ g/L LOEL = 3.7 μ g/L
Effects on MATC > 1.7 μ g/L < 3.7 μ g/L
Dry Weights

Male - NOEL = 1.7 μ g/L LOEL = 3.7 μ g/L
 MATC > 1.7 μ g/L < 3.7 μ g/L

The NOEL for female weight was higher than reported by the study author. This variability may be because the controls were not pooled when conducting the statistical analysis, as the study author has done.

- c. Discussion of Results - Additional raw data are required before the complete reproductive success can be calculated. With the current data, the number of young per reproductive per female can not be determined. This is a primary measurement for reproductive success. *Day*

Based on the data submitted it appears that reproduction may be affected at levels as low as 0.46 ng/L. This cannot be confirmed.

Survival and dry weights indicated a NOEL = 1.7 ng/L and a LOEL of 3.7 ng/L.

- d. Adequacy of Study

- 1) Classification - Supplemental for 98.5 percent w/w lambda cyhalothrin - also known as PP 321.

- 2) Rationale - The study appears to be scientifically sound, but until the necessary raw data with regards to number of males, females daily per test chamber per replicate are reported the reproductive success can not be determined. Other discrepancies outlined in section 14 also need to be addressed by the study author.
- 3) Rep^{ar}ability - Depending on data that needs to be submitted. ✓

Page _____ is not included in this copy.

Pages 11 through 26 are not included in this copy.

The material not included contains the following type of information:

- _____ Identity of product inert ingredients.
 - _____ Identity of product impurities.
 - _____ Description of the product manufacturing process.
 - _____ Description of quality control procedures.
 - _____ Identity of the source of product ingredients.
 - _____ Sales or other commercial/financial information.
 - _____ A draft product label.
 - _____ The product confidential statement of formula.
 - _____ Information about a pending registration action.
 - ☒ FIFRA registration data.
 - _____ The document is a duplicate of page(s) _____.
 - _____ The document is not responsive to the request.
-

The information not included is generally considered confidential by product registrants. If you have any questions, please contact the individual who prepared the response to your request.

```

CHVCLD
QED-LIB(ANOVAREZ)
.1
00010 //RMHXX JOB*(PHEDPPISP,C803),'LEE',PTY=4
00020 /*ROUTE PRINT HOLD
00030 //SAS EXEC SAS,REGION=1200K,PRINT=A
00040 //INDATA DD DSN=RMHPHED.ANOVADT,DISP=SHR
00050 OPTIONS LINESIZE=130;
00060 DATA A;
00070 INFILE INDATA MISSOEVER;
00080 INPUT TRT $ RESP1-RESP20;
00090 PROC PRINT;
00100 DATA B; SET A;
00110 DROP RESP1-RESP20;
OUT!

```

```

QED
cae
IKJ565001 SUBCOMMAND CAE NOT FOUND

```

```

QED
end
QED-LIB(ANOVAREZ)
end nosave

```

```

READY
l cae
IKJ528271 CAE
  A 10 15
  B 15 35
  C 25 30
  D 45 25
  E 15 30
  F 60 40
  G 75 65

```

```

READY
qed lib(anovarez)

```

```

QED
l 40
00040 //INDATA DD DSN=RMHPHED.INITIAL,DISP=SHR
c /initial/cae/

```

```

l *
00040 //INDATA DD DSN=RMHPHED.CAE,DISP=SHR
submit *

```

```

  JOB RMHXX (JOB09378) SUBMITTED
SUBMIT COMPLETED

```

```

QED
q loc
JOB#  JOBNAME  QUEUE  POSITION  LINES  DESTINATION
8146  RMH      TSO USER  224
9378  RMHXX     INPUT    A      28
8251  RMHXX     OUTPUT   A      1075    55 HOLD
8457  RMHXX     OUTPLT   A      1083    309 HOLD
8551  RMHXX     OUTPUT   A      1086    306 HOLD
8621  RMHXX     OUTPUT   A      1092    306 HOLD
8749  RMHXX     OUTPUT   A      1097    306 HOLD
2607  RMHGO     OUTPUT   A      1219    1025 HOLD
2612  RMHGO     OUTPUT   A      1220    1025 HOLD
2620  RMHGO     OUTPUT   A      1221    1025 HOLD

```

```

QUEUE
loc
JOB#  JOBNAME  QUEUE  POSITION  LINES  DESTINATION
8146  RMH      TSO USER  213
9378  RMHXX     INPUT    A      28
8251  RMHXX     OUTPUT   A      1065    55 HOLD
8457  RMHXX     OUTPUT   A      1073    309 HOLD
8551  RMHXX     OUTPUT   A      1076    306 HOLD
8621  RMHXX     OUTPUT   A      1082    306 HOLD

```

2612 RMHGD OUTPUT A 1215 1025 HOLD
2620 RMHGD OUTPUT A 1216 1025 HOLD

QUEUE

1

00010 A .97 .81 .94 .93 1.02 .88
00020 A .84 1.03 .89 .99 .89 .83 .84 1.11 1.05
00030 B .81 .79 .81 .75 .79 .94 1.03 .96 .89 .91 .84
00040 B .89 .93 .86 1.21 1.21 1.01 1.22 .82 .97 .94
00050 C .68 .96 .80 .79 .84 .69 .86 .85 .74
00060 C .73 .86 .69 1.27 1.27 .86
00070 D .91 1.15 .82 .81 .74 .75 .77 .97 .78 .69 .89 .71 1.06
00080 E .68 .87 .72 .71 1.01 .54 .94 .77
00090 E .92 .59 .68 .76 .99 .83 1.08
00100 E 1.08 .80 .77 .73 1.05 .69 1.00
00110 F 1.12 .53 .69 .75 .78 .62 .53 .74
00120 G .57 .51 .53
00130 G .54 .61 .62

END OF DATA

unnum

end save

SAVED

QED-LIB(ANDVAREZ)

qed lib(anovaez)

QED

1 40

INVALID COMMAND SYNTAX

QED

1 40

00040 //INDATA DD DSN=RMHPHD.CAF,DISP=SHR

c /caf/caj/

submit *

JOB RMHXX (JOB09794) SUBMITTED

SUBMIT COMPLETED

QED

qed cak new

INVALID COMMAND SYNTAX

QED

qed cak new

INPUT

00010 A .79 .69 .75 .74 .69 .84 .84 .77 .96 .81 .43
00020 a .78 .89 .87 .97 .84 .83 .94 .68
00030 b .62 .72 .87 .84 .81 .71
00040 b .92 .72 .67
00050 c .66 .63 .64 .84 .90 .71
00060 c .91 .67 .78 .84 .83 .74 .87 .92
00070 d .77
00080 d .78 .83 .96 .84 .69
00090 d .71 .85 .83 .82 .75 .81 .72
00100 e .77 .59 .75 .88 .79
00110 e .55 .83 .94 .91
00120 f .69 .58 .72 .89 .54
00130 f .63 .63 .64 .59 .67 .54 .63
00140 g .50 .62
00150 g .59 .578
00160 g .61 .53
00170

QED

1

00010 A .79 .69 .75 .74 .69 .84 .84 .77 .96 .81 .43
00020 A .78 .89 .87 .97 .84 .83 .94 .68
00030 B .62 .72 .87 .84 .81 .71
00040 B .92 .72 .67
00050 C .66 .63 .64 .84 .90 .71
00060 C .91 .67 .78 .84 .83 .74 .87 .92
00070 D .77

275
7794
initial
weights

initial
weights

```
QED
unnum
DATA SET IS NONUM
end save
SAVED
QED-LIB(ANOVAEZ)
qed lib(anovaez)
QED
1 40
00040 //INDATA DD DSN=RMHPHD.CAF,DISP=SHR
c /caf/cak/
submit *
      JOB RMHXX      (JOB05986) SUBMITTED
SUBMIT COMPLETED
```

q loc	JOB#	JOBNAME	QUEUE	POSITION	LINES	DESTINATION
	8146	RMH	TSD USER	164		
	9986	RMHXX	INPUT	A	15	
	8251	RMHXX	OUTPUT	A	1057	55 HOLD
	8457	RMHXX	OUTPUT	A	1063	309 HOLD
	8551	RMHXX	OUTPUT	A	1064	306 HOLD
	8621	RMHXX	OUTPUT	A	1070	306 HOLD
	8749	RMHXX	OUTPUT	A	1073	306 HOLD
	9378	RMHXX	OUTPUT	A	1101	322 HOLD
	9794	RMHXX	OUTPUT	A	1110	315 HOLD
	2607	RMHGO	OUTPUT	A	1209	1025 HOLD
	2612	RMHGO	OUTPUT	A	1210	1025 HOLD
	2620	RMHGO	OUTPUT	A	1211	1025 HOLD

QUEUE
 fetch 9378
 1 JES2 JOB LOG -- SYSTEM EPA2 -- NODE NCC16M1

```

f 'n.c.' all
168 NOTE: COPYRIGHT (C) 1984,1986 SAS INSTITUTE INC., CARY, N.C. 27511, U.S.A.
242 CARY, N.C. 27511-8000

```

1 242 999
 242 CARY, N.C. 27511-8000
 243

545

11:42 THURSDAY, MARCH 3, 1986

[illegible]

29

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249      B   R   P   P   P   P   P   P   P   F   P   1   1   1   1   1   1   1   1   1   2
250      S   T   1   2   3   4   5   6   7   8   9   0   1   2   3   4   5   6   7   8   9   0
251
252      1   A   10   15   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .
253      2   B   15   35   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .
254      3   C   25   30   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .
255      4   D   45   25   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .
256      5   E   15   30   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .
257      6   F   60   40   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .
258      7   G   75   65   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .   .
259
                                     SAS                                     11:42 THURSDAY, MARCH 3, 1988

```

```

260
261      GENERAL LINEAR MODELS PROCEDURE
262
263      CLASS LEVEL INFORMATION
264
265      CLASS      LEVELS      VALUES
266
267      TRT         7      A B C D E F G
268
269
270      NUMBER OF OBSERVATIONS IN DATA SET = 140
271
272

```

```

273 NOTE: ALL DEPENDENT VARIABLES ARE CONSISTENT WITH RESPECT TO THE PRESENCE OR ABSENCE OF MISSING VALUES. HOWEVER,
274 ONLY      14 OBSERVATIONS CAN BE USED IN THIS ANALYSIS.
275
                                     SAS                                     11:42 THURSDAY, MARCH 3, 1988

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```

276
277      GENERAL LINEAR MODELS PROCEDURE
278
279 DEPENDENT VARIABLE: EFFECT
280
281 SOURCE              DF      SUM OF SQUARES      MEAN SQUARE      F VALUE      PR > F      R-SQUARE      C.V
282
283 MODEL              6      1749.97415104      291.66235851      6.39      0.0139      0.845651      19.099
284
285 ERROR              7      319.40671188      45.62953027
286
287 CORRECTED TOTAL    13      2069.38086293
288
289
290 SOURCE              DF      TYPE I SS      F VALUE      PR > F      DF      TYPE III SS      F VALUE      PR > F
291
292 TRT                 6      1749.97415104      6.39      0.0139      6      1749.97415104      6.39      0.013
293
                                     SAS                                     11:42 THURSDAY, MARCH 3, 1988

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```

294
295      GENERAL LINEAR MODELS PROCEDURE
296
297      DUNCAN'S MULTIPLE RANGE TEST FOR VARIABLE: EFFECT
298      NOTE: THIS TEST CONTROLS THE TYPE I COMPARISONWISE ERROR RATE,
299      NOT THE EXPERIMENTWISE ERROR RATE
300
301      ALPHA=0.05 DF=7 MSE=45.6295
302
303      NUMBER OF MEANS      2      3      4      5      6      7
304      CRITICAL RANGE      15.8404  14.6017  14.2427  13.9174  13.6157  13.3355

```

30

MEANS WITH THE SAME LETTER ARE NOT SIGNIFICANTLY DIFFERENT.

	DUNCAN	GROUPING	MEAN	N	TRT
305					
306					
307					
308					
309					
310		A	56.842	2	G
311		A			
312	B	A	44.982	2	F
313	B				
314	B	C	36.051	2	D
315	B	C			
316	B	C	31.593	2	C
317	B	C			
318	B	C	29.517	2	B
319	B	C			
320	B	C	27.987	2	E
321		C			
322		C	20.602	2	A

QUEUE

```

loc
JOB# JOBNAME  QUEUE  POSITION  LINES  DESTINATION
8146 RMH      TSO USER      159
8251 RMHXX    OUTPUT  A      1056      55 HOLD
8457 RMHXX    OUTPUT  A      1062     309 HOLD
8551 RMHXX    OUTPUT  A      1063     306 HOLD
8621 RMHXX    OUTPUT  A      1069     306 HOLD
8749 RMHXX    OUTPUT  A      1071     306 HOLD
9378 RMHXX    OUTPUT  A      1099     322 HOLD
9794 RMHXX    OUTPUT  A      1108     315 HOLD
9986 RMHXX    OUTPUT  A      1117     318 HOLD
2607 RMHGO    OUTPUT  A      1210    1025 HOLD
2612 RMHGO    OUTPUT  A      1211    1025 HOLD
2620 RMHGO    OUTPUT  A      1212    1025 HOLD

```

QUEUE

fetch 9794

```

228
229
230      R      R      R      R      R      R      R      R      R      R      R      R      R      R      R      R      R      R      R      R
231      E      E      E      E      E      E      E      E      E      E      S      S      S      S      S      S      S      S      S      S
232      D      T      S      S      S      S      S      S      S      S      S      P      P      P      P      P      P      P      P      P      P
233      B      R      P      P      P      P      P      P      P      P      P      1      1      1      1      1      1      1      1      1      2
234      S      T      1      2      3      4      5      6      7      8      9      0      1      2      3      4      5      6      7      8      9      0
235
236      1      A      0.93      0.94      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .
237      2      B      0.87      1.01      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .
238      3      C      0.80      0.95      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .
239      4      D      0.89      0.83      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .
240      5      E      0.79      0.90      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .
241      6      F      0.78      0.68      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .
242      7      G      0.54      0.59      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .
243

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SAS

11:04 THURSDAY, MARCH 3, 1988

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS LEVELS VALUES

TRT 7 A B C D E F G

NUMBER OF OBSERVATIONS IN DATA SET = 140

NOTE: ALL DEPENDENT VARIABLES ARE CONSISTENT WITH RESPECT TO THE PRESENCE OR ABSENCE OF MISSING VALUES. HOWEVER,
ONLY 14 OBSERVATIONS CAN BE USED IN THIS ANALYSIS.

SAS

11:04 THURSDAY, MARCH 3, 1988

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: RESP

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V
MODEL	6	0.21197143	0.03532857	7.03	0.0107	0.857589	8.632
ERROR	7	0.03520000	0.00502857		ROOT MSE		RESP MEA
CORRECTED TOTAL	13	0.24717143			0.07091242		0.8214295

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR >
TRT	6	0.21197143	7.03	0.0107	6	0.21197143	7.03	0.010

SAS

11:04 THURSDAY, MARCH 3, 1988

GENERAL LINEAR MODELS PROCEDURE

DUNCAN'S MULTIPLE RANGE TEST FOR VARIABLE: RESP

32

ALPHA=0.05 DF=7 MSE=.0050286

NUMBER OF MEANS 2 3 4 5 6 7
CRITICAL RANGE 0.167552 0.174282 0.177899 0.179695 0.180723 0.181252

MEANS WITH THE SAME LETTER ARE NOT SIGNIFICANTLY DIFFERENT.

DUNCAN	GROUPING	MEAN	N	TRT
	A	0.94000	2	B
	A			
	A	0.93500	2	A
	A			
B	A	0.87500	2	C
B	A			
B	A	0.86000	2	D
B	A			
B	A	0.84500	2	E
B	A			
B	C	0.73000	2	F
	C			
	C	0.56500	2	G

*female
weight
mussel life
PP321*

QUEUE

fetch

Q0801 INVALID COMMAND - ENTER: "H" FOR COMMAND LIST

QUEUE

fetch 8551

1 JES2 JOB LOG -- SYSTEM EPA2 -- NODE NCCIBM1

QUEUE

f 'n.c.' all

168 NOTE: COPYRIGHT (C) 1984, 1986 SAS INSTITUTE INC., CARY, N.C. 27511, U.S.A.

226 CARY, N.C. 27511-8000

QUEUE

1 226 999

226 CARY, N.C. 27511-8000

227 SAS

11:02 THURSDAY, MARCH 3, 1988

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229

230 R R R R R R R R R R E E E E E E E E E E

231 E E E E E E E E E E S S S S S S S S S S

232 0 T S S S S S S S S S P P P P P P P P P P

233 B R P P P P P P P P P 1 1 1 1 1 1 1 1 1 1 2

234 S T 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0

235

236 1 A 1.01 0.60 .

237 2 B 0.99 0.79 .

238 3 C 0.31 0.30 .

239 4 D 0.22 0.10 .

240 5 E 0.18 0.18 .

241 6 F 0.00 0.02 .

242 7 G 0.00 0.00 .

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SAS

11:02 THURSDAY, MARCH 3, 1988

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GENERAL LINEAR MODELS PROCEDURE

246

CLASS LEVEL INFORMATION

247

CLASS LEVELS VALUES

248

TRT 7 A B C D E F G

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304
305
306
QUEUE
fetch 8457
!
QUEUE
F n.c. all

NOTE: ALL DEPENDENT VARIABLES ARE CONSISTENT WITH RESPECT TO THE PRESENCE OR ABSENCE OF MISSING VALUES. HOWEVER,
ONLY 14 OBSERVATIONS CAN BE USED IN THIS ANALYSIS.

SAS

11:02 THURSDAY, MARCH 3, 1988

GENERAL LINEAR MODELS PROCEDURE

DEPENDENT VARIABLE: RESP

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.
MODEL	6	1.60464286	0.26744048	16.79	0.0008	0.935029	37.59
ERROR	7	0.11150000	0.01592857		ROOT MSE		RESP ME
CORRECTED TOTAL	13	1.71614286			0.12620844		0.335714

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR >
TRT	6	1.60464286	16.79	0.0008	6	1.60464286	16.79	0.000

SAS

11:02 THURSDAY, MARCH 3, 1988

GENERAL LINEAR MODELS PROCEDURE

DUNCAN'S MULTIPLE RANGE TEST FOR VARIABLE: RESP

NOTE: THIS TEST CONTROLS THE TYPE I COMPARISONWISE ERROR RATE,
NOT THE EXPERIMENTWISE ERROR RATE

ALPHA=0.05 DF=7 MSE=.0159286

NUMBER OF MEANS	2	3	4	5	6	7
CRITICAL RANGE	0.298205	0.310183	0.316621	0.319818	0.321646	0.322588

MEANS WITH THE SAME LETTER ARE NOT SIGNIFICANTLY DIFFERENT.

DUNCAN	GROUPING	MEAN	N	TRT
	A	0.8900	2	B
	A	0.8050	2	A
	B	0.3050	2	C
	B	0.1800	2	E
	B	0.1600	2	D
	B	0.0100	2	F
	B	0.0000	2	G

OFFSPRING
AT

USING
DATA FROM
TABLE 5

NOEL = 0.2
LOEL 0.1

34

226 CARY, N.C. 27511-8000

227

228 99

226 CARY, N.C. 27511-8000

227

SAS

11:00 THURSDAY, MARCH 3, 1988

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SAS

11:00 THURSDAY, MARCH 3, 1988

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257 NOTE: ALL DEPENDENT VARIABLES ARE CONSISTENT WITH RESPECT TO THE PRESENCE OR ABSENCE OF MISSING VALUES. HOWEVER,

258 ONLY 48 OBSERVATIONS CAN BE USED IN THIS ANALYSIS.

259

SAS

11:00 THURSDAY, MARCH 3, 1988

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263 DEPENDENT VARIABLE: RESP

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277

GENERAL LINEAR MODELS PROCEDURE

CLASS LEVEL INFORMATION

CLASS	LEVELS	VALUES
TRT	7	A B C D E F G

NUMBER OF OBSERVATIONS IN DATA SET = 140

GENERAL LINEAR MODELS PROCEDURE

SOURCE	DF	SUM OF SQUARES	MEAN SQUARE	F VALUE	PR > F	R-SQUARE	C.V
MODEL	6	4517.47916667	752.91319444	8.41	0.0001	0.551620	102.080
ERROR	41	3672.00000000	89.56097561		ROOT MSE		FESP MEA
CORRECTED TOTAL	47	8189.47916667			9.46366608		9.2708333

SOURCE	DF	TYPE I SS	F VALUE	PR > F	DF	TYPE III SS	F VALUE	PR >
TRT	6	4517.47916667	8.41	0.0001	6	4517.47916667	8.41	0.000

SAS

11:00 THURSDAY, MARCH 3, 1988

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GENERAL LINEAR MODELS PROCEDURE

DUNCAN'S MULTIPLE RANGE TEST FOR VARIABLE: RESP
NOTE: THIS TEST CONTROLS THE TYPE I COMPARISONWISE ERROR RATE,
NOT THE EXPERIMENTWISE ERROR RATE

ALPHA=0.05 DF=41 MSE=89.561

WARNING: CELL SIZES ARE NOT EQUAL.
HARMONIC MEAN OF CELL SIZES=6.7354

NUMBER OF MEANS	2	3	4	5	6	7
CRITICAL RANGE	10.4152	10.9495	11.3087	11.5506	11.7504	11.9112

MEANS WITH THE SAME LETTER ARE NOT SIGNIFICANTLY DIFFERENT.

DUNCAN	GROUPING	MEAN	N	TRT
	A	28.143	7	B
	A	18.429	7	A
	B	7.857	7	C
	B	5.571	7	E
	B	3.000	8	D
	B	0.143	7	F
	B	0.000	5	G

NO. YOUNG
Per
Treatment
level

NOEL=
0.22 ng/l
LOEL=
0.46 ng/l

JES2 JOB LOG -- SYSTEM EPA2 -- NODE NCCIBM1

JES2 JOB LOG -- SYSTEM EPA2 -- NODE NCCIBM1

JES2 JOB LOG -- SYSTEM EPA2 -- NODE NCCIBM1

168 NOTE: COPYRIGHT (C) 1984,1986 SAS INSTITUTE INC., CARY, N.C. 27511, U.S.A.

36

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227      R      R      R      R      R      R      R      R      R      R      E      E      E      E      E      E      E      E      E      E
230      E      E      E      E      E      E      E      E      E      E      S      S      S      S      S      S      S      S      S      S
231      S      S      S      S      S      S      S      S      S      S      P      P      P      P      P      P      P      P      P      P
232      0      T      1      2      3      4      5      6      7      8      9      0      1      2      3      4      5      6      7      8      9      0
233      8      R      P      P      P      P      P      P      P      P      1      1      1      1      1      1      1      1      1      1      2
234      5      T      1      2      3      4      5      6      7      8      9      0      1      2      3      4      5      6      7      8      9      0
235
236      1      A      0.76      0.85      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .
237      2      B      0.76      0.77      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .
238      3      C      0.73      0.82      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .
239      4      D      0.81      0.78      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .
240      5      E      0.70      0.82      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .
241      6      F      0.68      0.65      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .
242      7      G      0.56      0.58      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .      .
243
SAS
11:10 THURSDAY, MARCH 3, 1988

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244
245      GENERAL LINEAR MODELS PROCEDURE
246
247      CLASS LEVEL INFORMATION
248
249      CLASS      LEVELS      VALUES
250
251      TRT          7      A B C D E F G
252
253
254      NUMBER OF OBSERVATIONS IN DATA SET = 140
255
256

```

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257 NOTE: ALL DEPENDENT VARIABLES ARE CONSISTENT WITH RESPECT TO THE PRESENCE OR ABSENCE OF MISSING VALUES. HOWEVER,
258 ONLY 14 OBSERVATIONS CAN BE USED IN THIS ANALYSIS.
259
SAS
11:10 THURSDAY, MARCH 3, 1988

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260
261      GENERAL LINEAR MODELS PROCEDURE
262
263 DEPENDENT VARIABLE: RESP
264
265 SOURCE      DF      SUM OF SQUARES      MEAN SQUARE      F VALUE      PR > F      R-SQUARE      C.V
266
267 MODEL          6      0.08747143      0.01457857      6.20      0.0150      0.841707      6.608
268
269 ERROR          7      0.01645000      0.00235000      ROOT MSE      RESP MEA
270
271 CORRECTED TOTAL      13      0.10392143      0.04847680      0.7335714
272
273
274 SOURCE      DF      TYPE I SS      F VALUE      PR > F      DF      TYPE III SS      F VALUE      PR >
275
276 TRT          6      0.08747143      6.20      0.0150      6      0.08747143      6.20      0.015
277
SAS
11:10 THURSDAY, MARCH 3, 1988

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278
279      GENERAL LINEAR MODELS PROCEDURE
280
281      DUNCAN'S MULTIPLE RANGE TEST FOR VARIABLE: RESP
282      NOTE: THIS TEST CONTROLS THE TYPE I COMPARISONWISE ERROR RATE,
283      NOT THE EXPERIMENTWISE ERROR RATE
284

```

37

NUMBER OF MEANS 2 3 4 5 6 7
 CRITICAL RANGE 0.114541 0.119142 0.121614 0.122842 0.123545 0.123906

MEANS WITH THE SAME LETTER ARE NOT SIGNIFICANTLY DIFFERENT.

DUNCAN	GROUPING	MEAN	N	TRT
	A	0.80500	2	A
	A			
	A	0.79500	2	D
	A			
B	A	0.77500	2	C
B	A			
B	A	0.76500	2	B
B	A			
B	A	0.76000	2	E
B	A			
B	D	0.66500	2	F
	C			
	C	0.57000	2	G

*mean
male
weights*

QUEUE

feet

Q0801 INVALID COMMAND - ENTER: "H" FOR COMMAND LIST

QUEUE

fetch 8251

1

JES2 JOB LOG -- SYSTEM EPA2 -- NODE NCCIBM1

QUEUE

f 'n.c.' all

QUEUE

bottom

55

22

IEF624I INCORRECT USE OF PERIOD IN THE DSNAME FIELD

QUEUE

top

1

JES2 JOB LOG -- SYSTEM EPA2 -- NODE NCCIBM1

QUEUE

f 'error'

3 10.49.24 JOB 8251 IEF452I RMHXX JOB NOT RUN - JCL ERROR

QUEUE

f 'error' all

QUEUE

end

QED

end nosave

QED-LIB(ANOVAEZ)

INPUT

00340

QED

end nosave

QED-LIB(ANOVAEZ)

INPUT

00340

QED

QED

end

NOTHING SAVED-ENTER SAVE OR END

nosave

IKJ56500I SUBCOMMAND NOSAVE NOT FOUND

QED

end nosave

QED-LIB(ANOVAEZ)